

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



(NASA-SP-7011(386)) AEROSPACE
MEDICINE AND BIOLOGY: A CONTINUING
BIBLIOGRAPHY WITH INDEXES
(SUPPLEMENT 386) (NASA) 56 p

N94-28208

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March 1994

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



National Aeronautics and Space Administration
Scientific and Technical Information Program
Washington, DC

1994

This publication was prepared by the NASA Center for AeroSpace Information,
800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934, (301) 621-0390.

INTRODUCTION

This issue of *Aerospace Medicine and Biology* (NASA SP-7011) lists 117 reports, articles, and other documents recently announced in the NASA STI Database. The first issue of *Aerospace Medicine and Biology* was published in July 1964.

Accession numbers cited in this issue include:

<i>Scientific and Technical Aerospace Reports (STAR)</i> (N-10000 Series)	N94-18415 — N94-21760
Open Literature (A-10000 Series)	A94-11841 — A94-13206

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations include the original accession numbers from the respective announcement journals.

Seven indexes—subject, personal author, corporate source, foreign technology, contract number, report number, and accession number—are included.

A cumulative index for 1994 will be published in early 1995.

Information on availability of documents listed, addresses of organizations, and CASI price schedules are located at the back of this issue.

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TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED

ON MICROFICHE

ACCESSION NUMBER → N94-11045*# Pennsylvania State Univ., Hershey. Coll. of ← CORPORATE SOURCE
Medicine.

TITLE → EFFECTS OF CSF HORMONES AND IONIC COMPOSITION ON
SALT/WATER METABOLISM Final Technical Report, 1 Mar.
1981 - 31 Dec. 1992

AUTHOR → WALTER B. SEVERS 31 Dec. 1992 32 p ← PUBLICATION DATE

CONTRACT NUMBER → (Contract NCC2-127)

REPORT NUMBERS → (NASA-CR-193232; NAS 1.26:193232) Avail: CASI HC A03/MF ← AVAILABILITY AND
A01 PRICE CODE

The consequences of headward fluid shifts during manned spaceflight was studied. Such shifts were recognized early by both U.S. and Soviet scientists because of signs and symptoms referable to the head. Some of these include disturbed vision, puffiness in the face and periorbital areas, headache, vestibular dysfunction, and distended jugular veins. We posited that the fluid shift had an immediate effect on the brain and a long-term action requiring a neural interpretation of the flight environment. This would re-adjust both efferent neural as well as hormonal mechanisms to sustain cardiovascular and fluid/electrolyte balance consonant with survival in microgravity. Work along these lines is summarized. A synopsis of some of the main research is presented. The following topics were studied: (1) angiotensin and vasopressin action in the central nervous system; (2) intracranial pressure control; (3) research on subcommissural organ; and (4) research on the eye.

Author (revised)

TYPICAL JOURNAL ARTICLE CITATION AND ABSTRACT

ACCESSION NUMBER → A94-11095

TITLE → SEA-LEVEL P(CO₂) RELATES TO VENTILATORY
ACCLIMATIZATION AT 4,300 M

AUTHORS → JOHN T. REEVES, ROBERT E. MCCULLOUGH, LORNA G.
MOORE, ALLEN CYMERMAN, and JOHN V. WEIL (Colorado Univ., ← AUTHORS' AFFILIATION
Denver; U.S. Army, Research Inst. of Environmental Medicine,
Natick, MA) Journal of Applied Physiology (ISSN 8750-7587) ← JOURNAL TITLE
vol. 75, no. 3 Sept. 1993 p. 1117-1122. refs ← PUBLICATION DATE

CONTRACT NUMBERS → (Contract DAMD81-C-1057; DAMD17-91-C-1112; NIH-HL-14985)
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The hypothesis of Hirshman et al. (1978) and Weil (1986) that the large (over an eightfold range) individual variations in the strength of the hypoxic ventilatory response (HVR) observed in the laboratory are related to ventilatory acclimatization to altitude was tested. End-tidal P(CO₂) values were measured in 37 resting subjects at sea level (showing a 34-48 Torr range) and after the subjects were taken to Pikes Peak (4300 m), with measurements made on arrival and repeatedly over 19 days. It was found that, at 4300 m, subjects with high end-tidal P(CO₂) had low values of arterial oxygen saturation, Sa(O₂), and that sea-level end-tidal P(CO₂) related to Sa(O₂) after 19 days at 4300 m. The end-tidal P(CO₂) values on arrival and after 19 days at 4300 m were inversely related to the sea-level HVR values.

AIAA

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 386)

March 1994

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LIFE SCIENCES (GENERAL)

A94-11954* National Aeronautics and Space Administration, Washington, DC.

CALIBRATING RATES OF EARLY CAMBRIAN EVOLUTION

SAMUEL A. BOWRING, JOHN P. GROTZINGER, CLARK E. ISACHSEN (MIT, Cambridge, MA), ANDREW H. KNOLL (Harvard Univ., Cambridge, MA), SHANE M. PELECHATY (MIT, Cambridge, MA), and PETER KOLOSOV (Yakutian Geoscience Inst., Yakutsk, Russia) *Science* (ISSN 0036-8075) vol. 261, no. 5126 Sept. 3, 1993 p. 1293-1298. Research supported by NSF, NASA, and Maxus Energy Corp refs

Copyright

An explosive episode of biological diversification occurred near the beginning of the Cambrian period. Evolutionary rates in the Cambrian have been difficult to quantify accurately because of a lack of high-precision ages. Currently, uranium-lead zircon geochronology is the most powerful method for dating rocks of Cambrian age. Uranium-lead zircon data from lower Cambrian rocks located in northeast Siberia indicate that the Cambrian period began about 544 million years ago and that its oldest (Manykian) stage lasted no less than 10 million years. Other data indicate that the Tommotian and Atdabanian stages together lasted only 5 to 10 million years. The resulting compression of Early Cambrian time accentuates the rapidity of both the faunal diversification and subsequent Cambrian turnover. Author (revised)

N94-18476# Argonne National Lab., IL.

THE C-JUN GENE EXPRESSION IN HUMAN CELLS EXPOSED TO EITHER IONIZING RADIATION OR HYDROGEN PEROXIDE

F. R. COLLART, M. HORIO, and E. HUBERMAN Jun. 1993 6 p Presented at the International Seminar on Molecular Mechanisms in Radiation Mutagenesis and Carcinogenesis, Doorwerth, Netherlands, 19-22 Apr. 1993

(Contract W-31-109-ENG-38)

(DE93-017436; ANL/CBM/CP-80231; CONF-930454-3) Avail: CASI HC A02/MF A01

We investigated the role of reactive oxygen intermediates (ROI's) and protein kinase C (PKC) in radiation- and H₂O₂-evoked c-jun gene expression in human HL-205 cells. This induction of c-jun gene expression could be prevented by pretreatment of the cells with N-acetylcysteine (an antioxidant) or H7 (a PKC and PKA inhibitor) but not by HA1004, a PKA inhibitor, suggesting a role for ROIs and PKC in mediating c-jun gene expression. We also investigated potential differences in c-jun gene expression in a panel of normal and tumor cells untreated or treated with ionizing radiation or H₂O₂. Treatment with radiation or H₂O₂ produced a varied response, from some reduction to an increase of more than an order of magnitude in the steady-state level of c-jun mRNA. These data indicate that although induction of c-jun may be a common response to ionizing radiation and H₂O₂, this response was reduced or absent in some cell types. DOE

N94-18924# Michigan State Univ., East Lansing. Dept. of Pediatrics/Human Development.

THE ROLE OF CHEMICAL INHIBITION OF GAP JUNCTIONAL INTERCELLULAR COMMUNICATION IN TOXICOLOGY Annual Report, 15 May 1992 - 14 May 1993

JAMES E. TROSKO and BURRA V. MADHUKAR 19 May 1993 15 p

(Contract F49620-92-J-0293; AF PROJ. 2312)

(AD-A269251; AFOSR-93-0675TR) Avail: CASI HC A03/MF A01

Progress during this past grant period has continued to mount, with new findings, new techniques to achieve our aims and objectives, and new support for our original working hypothesis that chemical modulation of gap junctional intercellular communication (GJIC) is involved in multiple formats of toxicity. We now have evidence on how certain tumor promoting chemicals, neurotoxicants, reproductive toxicants, teratogens, or immunotoxicants can affect GJIC at either the transcriptional, translational, or posttranslational levels. Using cells mutated for altered GJIC; transfected with various oncogenes; or treated with different kinds of chemical toxicants, We have now elucidated the different mechanisms by which GJIC can be effected. This new mechanistic understanding should contribute to a more biologically-based risk assessment model and an understanding of how epigenetic toxicants work. DTIC

N94-19210*# National Aeronautics and Space Administration, Washington, DC.

SPACE LIFE SCIENCES RESEARCH: THE IMPORTANCE OF LONG-TERM SPACE EXPERIMENTS

Oct. 1993 43 p Prepared in cooperation with George Washington Univ., Washington, DC

(NASA-TM-4502; NAS 1.15:4502) Avail: CASI HC A03/MF A01

This report focuses on the scientific importance of long-term space experiments for the advancement of biological science and the benefit of humankind. It includes a collection of papers that explore the scientific potential provided by the capability to manipulate organisms by removing a force that has been instrumental in the evolution and development of all organisms. Further, it provides the scientific justification for why the long-term space exposure that can be provided by a space station is essential to conduct significant research.

N94-19211*# National Aeronautics and Space Administration, Washington, DC.

THE RATIONALE FOR FUNDAMENTAL RESEARCH IN SPACE BIOLOGY: INTRODUCTION AND BACKGROUND

THORA W. HALSTEAD and ROBERT W. KRAUSS *In its Space Life Sciences Research: The Importance of Long-Term Space Experiments* p 1-2 Oct. 1993

Avail: CASI HC A01/MF A01

With the construction of Space Station Freedom, NASA will have available a new platform for experiments in space that promises many advantages over those already flown. Biologists are poised to take advantage of the greater space, the increased power, and especially the long duration of the station for a cascade of innovative experiments in fundamental science that are long overdue. The unique space environment will provide new dimensions for approaching some of the most challenging problems still facing modern biology. Solutions to basic questions about living systems, which may now be grown through many generations

51 LIFE SCIENCES (GENERAL)

in space, will not only explain abnormalities already observed there, but will add to our understanding of how life functions on Earth. Much will be learned about evolution that has built us the way we are, but also about what it has in store for the Earth's species in the future. NASA must not lose this opportunity to contribute to the welfare of the peoples of the Earth while at the same time create knowledge that will enable human exploration of space in the decades ahead. Author

N94-19212*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

OPPORTUNITIES AND QUESTIONS FOR THE FUNDAMENTAL BIOLOGICAL SCIENCES IN SPACE

JOSEPH C. SHARP and JOAN VERNIKOS *In NASA. Headquarters, Space Life Sciences Research: The Importance of Long-Term Space Experiments p 3-6 Oct. 1993*

Avail: CASI HC A01/MF A01

With the advent of sophisticated space facilities we discuss the overall nature of some biological questions that can be addressed. We point out the need for broad participation by the biological community, the necessary facilities, and some unique requirements. Author

N94-19213*# National Aeronautics and Space Administration, Washington, DC.

SPACE RESEARCH WITH INTACT ORGANISMS: THE ROLE OF SPACE STATION FREEDOM

ROBERT W. PHILLIPS and FRANCIS J. HADDY (Uniformed Services Univ. of the Health Sciences, Bethesda, MD.) *In its Space Life Sciences Research: The Importance of Long-Term Space Experiments p 7-12 Oct. 1993*

Avail: CASI HC A02/MF A01

The study of intact organisms has provided biologists with a good working knowledge of most of the common organisms that have evolved in the 1 g environment of Earth. Reasonably accurate predictions can be made about organismal responses to most stimuli on Earth. To extend this knowledge to life without gravity, we must have access to the space environment for prolonged periods. Space Station Freedom will provide a facility with which to begin this type of research. Spaceflight research to date has been limited to relatively short-term exposures that have been informative but incomplete. This paper provides a brief background of known changes that have occurred in intact organisms in the space environment and proposes the kinds of experiments that are needed to expand our knowledge of life on Earth and in space. Author

N94-19214*# Arizona Univ., Tucson. Dept. of Biochemistry.

SPACE RESEARCH ON ORGANS AND TISSUES

MARC E. TISCHLER and EMILY MOREY-HOLTON (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.) *In NASA. Headquarters, Space Life Sciences Research: The Importance of Long-Term Space Experiments p 13-20 Washington Oct. 1993*

Avail: CASI HC A02/MF A01

Studies in space on various physiological systems have and will continue to provide valuable information on how they adapt to reduced gravitational conditions, and how living in a 1 g (gravity) environment has guided their development. Muscle and bone are the most notable tissues that respond to unweighting caused by lack of gravity. The function of specific muscles and bones relates directly to mechanical loading, so that removal of 'normal forces' in space, or in bedridden patients, causes dramatic loss of tissue mass. The cardiovascular system is also markedly affected by reduced gravity. Adaptation includes decreased blood flow to the lower extremities, thus decreasing the heart output requirement. Return to 1 g is associated with a period of reconditioning due to the deconditioning that occurs in space. Changes in the cardiovascular system are also related to responses of the kidney and certain endocrine (hormone-producing) organs. Changes in respiratory function may also occur, suggesting an effect on the lungs, though this adaptation is poorly understood. The neurovestibular system, including the brain and organs of the inner

ear, must adapt to the disorientation caused by lack of gravity. Preliminary findings have been reported for liver. Additionally, endocrine organs responsible for release of hormones such as insulin, growth hormone, glucocorticoids, and thyroid hormone may respond to spaceflight. Author

N94-19215*# Kansas State Univ., Manhattan. Div. of Biology.

A SCIENTIFIC ROLE FOR SPACE STATION FREEDOM:

RESEARCH AT THE CELLULAR LEVEL

TERRY C. JOHNSON and JOHN N. BRADY (National Cancer Inst., Bethesda, MD.) *In NASA. Headquarters, Space Life Sciences Research: The Importance of Long-Term Space Experiments p 21-29 Washington Oct. 1993*

(Contract NAGW-1197; NAGW-2328)

Avail: CASI HC A02/MF A01

The scientific importance of Space Station Freedom is discussed in light of the valuable information that can be gained in cellular and developmental biology with regard to the microgravity environment on the cellular cytoskeleton, cellular responses to extracellular signal molecules, morphology, events associated with cell division, and cellular physiology. Examples of studies in basic cell biology, as well as their potential importance to concerns for future enabling strategies, are presented. Author

N94-19216*# Washington State Univ., Pullman. Inst. of Biological Chemistry.

MICROGRAVITY RESEARCH IN PLANT BIOLOGICAL SYSTEMS: REALIZING THE POTENTIAL OF MOLECULAR BIOLOGY

NORMAN G. LEWIS and CLARENCE A. RYAN *In NASA. Headquarters, Space Life Sciences Research: The Importance of Long-Term Space Experiments p 31-34 Washington Oct. 1993*

Avail: CASI HC A01/MF A01

The sole all-pervasive feature of the environment that has helped shape, through evolution, all life on Earth is gravity. The near weightlessness of the Space Station Freedom space environment allows gravitational effects to be essentially uncoupled, thus providing an unprecedented opportunity to manipulate, systematically dissect, study, and exploit the role of gravity in the growth and development of all life forms. New and exciting opportunities are now available to utilize molecular biological and biochemical approaches to study the effects of microgravity on living organisms. By careful experimentation, we can determine how gravity perception occurs, how the resulting signals are produced and transduced, and how or if tissue-specific differences in gene expression occur. Microgravity research can provide unique new approaches to further our basic understanding of development and metabolic processes of cells and organisms, and to further the application of this new knowledge for the betterment of humankind. Author

N94-19217*# North Carolina State Univ., Raleigh. Dept. of Animal Science.

LIFE: ORIGIN AND EVOLUTION ON EARTH--HOW CAN WE ESCAPE?

CLEMENT L. MARKERT and ABRAHAM D. KRIKORIAN (State Univ. of New York, Stony Brook.) *In NASA. Headquarters, Space Life Sciences Research: The Importance of Long-Term Space Experiments p 35-39 Washington Oct. 1993*

Avail: CASI HC A01/MF A01

Exploitation of gene regulation rather than the creation of new genes has been predominantly responsible for the evolutionary advances in animals and plants that are widely recognized today. Until very recently it was not possible to examine life in the absence of gravity. We can now imagine forms of life in the universe adapting to circumstances different from those found on Earth. Our own life forms would surely become different in time if they were transferred to other planets with different conditions, including much lower or higher gravity. Author

N94-19341# Oak Ridge National Lab., TN.

EFFECT OF EMP FIELDS ON CELL MEMBRANE POTENTIALS

P. C. GAILEY and C. E. EASTERLY 1993 2 p Presented at the Nuclear Science Symposium, San Francisco, CA, 2-5 Nov. 1993

(Contract DE-AC05-84OR-21400)

(DE93-015819; CONF-931107-3) Avail: CASI HC A01/MF A01

A simple model is presented for cell membrane potentials induced during exposure to electromagnetic pulse (EMP). Using calculated values of internal electric field strength induced during EMP exposure, the model predicts that cell membrane potentials of about 100 mV may be induced for time frames on the order of 10 ns. Possible biological effects of these potentials including electroporation are discussed. DOE

N94-19757 Biological Components Corp., Menlo Park, CA.
PHOTOSYNTHETIC REACTION CENTERS AS ACTIVE MOLECULAR ELECTRONIC COMPONENTS, PHASE 1 Final Report, 15 Jan. - 14 Jul. 1993

ALBERT F. LAWRENCE 13 Aug. 1993 51 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DAAH04-93-C-0003)

(AD-A271388; ARO-30818.1-CH-SBI-PHASE-1) Avail: CASI HC A04

The aim of this project is the development of reaction centers from photosynthetic bacteria for use in molecule-based components and devices. Reaction centers (RC's) exhibit a highly efficient, rapid, long-distance photoinduced charge separation under a wide variety of conditions. The reaction center has electronic properties which are far superior, more flexible, and much less expensive to produce than any known synthetic donor/acceptor system. During the course of this project the author developed strategies for the attachment of reaction centers to electrode surfaces, and demonstrated the first steps in this process. The approach employed molecular modeling, site-directed mutagenesis, and the attachment of dye molecules to a particular RC site. Correlated developments include refinement and simplification of the process for preparing reaction centers, studies of materials issues, studies of device concepts, and transfer of RC preparation techniques to Biological Components Corporation. DTIC

N94-19789# Wright State Univ., Dayton, OH. Dept. of Chemistry.

A STUDY OF THE EFFECT OF HYDROCARBON STRUCTURE ON THE INDUCTION OF MALE RAT NEPHROPATHY AND METABOLIC STRUCTURE Final Report, 1 Jun. 1989 - 31 Aug. 1993

M. P. SERVE 31 Aug. 1993 64 p

(Contract AF-AFOSR-0396-89)

(AD-A270969; AFOSR-93-0751TR) Avail: CASI HC A04/MF A01

Certain hydrocarbons were shown to cause nephrotoxicity in male rats. Since many of the hydrocarbons have a branched alkyl side chain, several isomers of octane including 2,5-dimethylhexane, 2-methylheptane, 3-methylheptane, and 4-methylheptane were evaluated on their ability to induce the nephrotoxicity. Since the above hydrocarbons are components of fuels and solvents, an investigation into their pathways of metabolism was undertaken in order to see if a pattern of biotransformation could be deduced and determined if potentially harmful metabolites were produced. Male 344 Fischer rats were dosed intragastrically with the above hydrocarbons over a 14 day period. When compared with rats, the order of nephrotoxicity was determined. DTIC

N94-19826 California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH RESOLUTION ELECTRON CRYSTALLOGRAPHY OF PROTEIN MOLECULES

R. M. GLAESER and K. H. DOWNING Jun. 1993 21 p Presented at the John M. Crowley Symposium on Ultramicroscopy, Scottsdale, AZ, 5-8 Jan. 1993 Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DE-AC03-76SF-00098)

(DE93-040114; LBL-34224; CONF-9301114-3) Avail: Issuing

Activity (Department of Energy (DOE))

Electron diffraction data and high resolution images can now

be used to obtain accurate, three-dimensional density maps of biological macromolecules. These density maps can be interpreted by building an atomic-resolution model of the structure into the experimental density. The Cowley-Moodie formalism of dynamical diffraction theory was used to validate the use of kinematic diffraction theory, strictly the weak phase object approximation, in producing such 3-D density maps. Further improvements in the preparation of very flat specimens and in the retention of diffraction to a resolution of 0.2 nm or better could result in electron crystallography becoming as important a technique as x ray crystallography currently is for the field of structural molecular biology. DOE

N94-19866# Los Alamos National Lab., NM.

A COMPLEX SYSTEMS APPROACH TO COMPUTATIONAL MOLECULAR BIOLOGY

A. LAPEDES 1993 24 p Presented at the Santa Fe Institute Workshop on Integrative Themes, Santa Fe, NM, 8-15 Aug. 1992 (Contract W-7405-ENG-36)

(DE93-040062; LA-UR-93-2909; CONF-9208239-1) Avail: CASI HC A03/MF A01

The containing research program at Santa Fe Institute that applies complex systems methodology to computational molecular biology is reported. Two aspects stressed are the use of co-evolving adaptive neutral networks for determining predictable protein structure classifications, and the use of information theory to elucidate protein structure and function. A 'snapshot' of the current state of research in these two topics is presented, representing the present state of two major research thrusts in the program of Genetic Data and Sequence Analysis at the Santa Fe Institute. DOE

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

A94-12178

STUDIES ON WATER ELECTROLYTE METABOLISM AND ENDOCRINE RESPONSES AT REST AND DURING

SUBMAXIMAL EXERCISE AT 6,000 M SIMULATED ALTITUDE

ISAO SUGANUMA, KOH MIZUNO (Tsukuba Univ., Japan), YASUHIITO KUMAZAKI (Tokyo Metropolitan Health Promotion Foundation, Health Promotion Center, Shinjuku, Japan), and KATSUMI ASANO (Tsukuba Univ., Japan) Japanese Journal of Aerospace and Environmental Medicine (ISSN 0387-0723) vol. 30, no. 3 Sept. 1993 p. 109-116. In JAPANESE refs Copyright

Five healthy male climbers were investigated in a hypobaric simulator to elucidate the effect of severe hypobaric exposure on water-electrolyte metabolism and endocrine response at rest and during exercise. The test regimen is described. The results show that endocrine responses of stress, sodium retention, and antidiuresis were relatively mild. However, urine and endocrine responses after exercise at 6000 m became highly variant among the subjects. It is suggested that the above mentioned endocrine responses after exercise at 6000 m correlate with vulnerability to acute mountain sickness during actual mountaineering. AIAA

A94-12179

EFFECTS OF TRAINING AT SIMULATED ALTITUDE OF 6,000 M ON ENDOCRINE RESPONSES AT REST AND DURING EXERCISE AT THE SAME ALTITUDE

KOH MIZUNO, ISAO SUGANUMA (Tsukuba Univ., Japan), YASUHIITO KUMAZAKI (Tokyo Metropolitan Health Promotion Foundation, Health Promotion Center, Shinjuku, Japan), and KATSUMI ASANO (Tsukuba Univ., Japan) Japanese Journal of

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Aerospace and Environmental Medicine (ISSN 0387-0723) vol. 30, no. 3 Sept. 1993 p. 117-125. In JAPANESE refs Copyright

The effect of intermittent hypobaric training on the response of the endocrine system at rest and during exercise under hypobaric hypoxia at a simulated altitude of 6000 m was studied in two male subjects: an elite climber aged 35 yrs and a beginning climber aged 27 yrs. The training regimen is described. The results showed that the beginning climber showed a remarkable increase in blood ACTH, ADH, aldosterone, and PRA after exercise; this increase tended to decrease as training progressed. The elite climber showed almost no change in these hormones after exercise throughout the training sessions. The beginning climber exhibited a heart rate decrease of 20-30 beats/min during exercise as the training progressed. The elite climber showed no obvious changes in heart rate during the regimen. AIAA

A94-12180

SOME ISSUES ON JAPAN'S SPACE FOOD DEVELOPMENT AND RELATING PRELIMINARY EXPERIMENTAL STUDY

SHUJI KANDA (Kawasaki Heavy Industries, Ltd., Tokyo, Japan), SHIZUKO YAMAGUCHI (Ajinomoto Co., Inc., Kawasaki, Japan), CHIHARU SEKIGUCHI, SEI YUMIKURA (NASDA, Tokyo, Japan), MAKOTO DOI (Japan Defense Agency, Bureau of Education and Training, Tokyo), MASAO ITO, AKIRA MIYAMOTO, and KAZUYOSHI YAJIMA (Nihon Univ., Tokyo, Japan) Japanese Journal of Aerospace and Environmental Medicine (ISSN 0387-0723) vol. 30, no. 3 Sept. 1993 p. 127-133. In JAPANESE refs Copyright

Physiological and psychological issues concerning the Japanese space food were investigated using taste sensitivity tests under bed rest conditions at 1 G and under microgravity simulated by the head down tilt (HDT) condition. The test results indicate no significant change of taste sensitivity between the upright and the HDT conditions. It is concluded that food acceptable in humans under 1 G gravity and microgravity conditions is the same. AIAA

N94-18538# Colorado State Univ., Fort Collins. Dept. of Anatomy and Neurobiology.

INTRACELLULAR PHYSIOLOGY OF THE RAT SUPRACHIASMATIC NUCLEUS: ELECTRICAL PROPERTIES, NEUROTRANSMISSION AND EFFECTS OF NEUROMODULATORS Final Report, 15 Jul. 1992 - 14 Jul. 1993

F. E. DUDEK 30 Apr. 1993 13 p
(Contract F49620-92-J-0417)

(AD-A268829) Avail: CASI HC A03/MF A01

Knowledge of the neuronal membrane properties and synaptic physiology of the suprachiasmatic nucleus (SCN) is critical for an understanding of the cellular basis of circadian rhythms in mammals. The hypothalamic slice preparation from rodents and a combination of electrophysiological techniques (i.e., extracellular single- and multiple-unit recording, intracellular recording, and whole-cell patch clamp) were used to study the following: (1) the role of excitatory and inhibitory amino acids (i.e., glutamate and GABA) in synaptic transmission; (2) the membrane properties of SCN neurons; and (3) the mechanisms of neuronal synchronization. Antagonists for N-methyl-D-aspartate (NMDA) and non-NMDA receptors blocked excitatory postsynaptic potentials (EPSPs) evoked by stimulation of the optic nerve other sites when SCN cells were depolarized or at rest, respectively. Bicuculline blocked inhibitory postsynaptic potentials (IPSP's) that were evoked by local stimulation or that occurred spontaneously. The IPSP reversal potential was near the Cl^- equilibrium potential and was shifted to depolarized levels by raising intracellular Cl^- . Thus, glutamate and GABA appear to mediate fast excitatory inhibitory synaptic transmission in the SCN. Some SCN neurons, but not all of them, have low-threshold Ca^{2+} spikes and time-dependent inward rectification, thus indicating that the electrical properties of SCN neurons are not homogenous. Neurons with a firing rate greater than 6 Hz had a regular pattern, and neurons with a rate less than 4 Hz had an irregular pattern; since both the firing rate and

pattern could be modified with injected currents, SCN neurons with different firing patterns are unlikely to represent distinct classes of cells. DTIC

N94-18598 Louisiana State Univ., New Orleans. Medical Center.

METABOLIC CHANGES AND HEMODYNAMIC DYSFUNCTION FOLLOWING HYPOTHERMIC SHOCK Final Technical Report

HARVEY I. MILLER 30 Jun. 1993 20 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract N00014-89-J-3124)

(AD-A269780; WES/TR/HL-93-10) Avail: CASI HC A03

The results of the metabolic studies suggest that while there are very large increases in circulating catecholamines, the catecholamines were less sensitive in the hypothermic animals after rewarm. Heart rate was elevated almost immediately upon immersion in cold water and did not fall until 2 minutes after immersion. When the BT returned to normal (0 time) so did the heart rate, even though the catecholamine levels were very high. It would appear that the adrenergic receptors are down-regulated and seemed less sensitive. This may be the reason for lack of elevation of the FFA. However another explanation maybe the 'Adipose Tissue Electronic Blanket Theory'. The changes we observed in the metabolic samples (FFA, glucose and lactate) are related to the elevation of NorEpi. When the energy bearing metabolites cannot be mobilized by catecholamines due to down-regulation and, the futile cycle of triglycerides within the adipose tissue does not produce the heat required, then the organism can no longer thermoregulate appropriately. DTIC

N94-18632 Minnesota Univ., Duluth.

EVALUATION OF PHYSIOLOGICAL AND PSYCHOLOGICAL IMPAIRMENT OF HUMAN PERFORMANCE IN COLD

STRESSED SUBJECTS Final Report, 9 May 1988 - 8 May 1992

LORENTZ E. WITTMERS and RICHARD HOFFMAN 5 Jun. 1993 183 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DAMD17-88-C-8054; DA PROJ. 301-62787-A-879)

(AD-A268637) Avail: CASI HC A09

The effects of 2 shiver suppression techniques on performance of military relevant motor tasks, body heat conservation, and metabolic functions during cold exposure were investigated using a repeated measures MANOVA design. Nine male volunteers, 24.3 ± 0.8 yr, were exposed for 3 hours to 3 conditions: (1) warm W = 21 deg C air; (2) Cold C = -7 deg C air; and (3) Shiver suppression (SS) = -7 deg C air with shiver suppression techniques (breath holding and voluntary relaxation) applied. Motor speed and accuracy tasks included rifle and pistol shooting and reloading, magazine reloading. Rectal temperature decreased more during SS than in W or C. Skin temperatures and temperature perceptions in C and SS declined more than W, but were similar to each other. Heart rate decreased in W and increased in C and SS. Performance on motor tasks showed decrement's with both C and SS. Decrements in rifle reloading and pistol reloading were less in SS than in C. Decrements in rifle and pistol shooting performance were greater in SS than in C. Decrements in magazine loading were not significantly different in SS and C. In conclusion, SS caused a decline in core temperature, and an improvement in cold exposure performance in simple repetitive motor tasks involving little concentration, but a decrement in performance in tasks which required more mental concentration. DTIC

N94-18793 Naval Command, Control and Ocean Surveillance Center, San Diego, CA. RDT and E Div.

COUPLED NEURAL-DENDRITIC PROCESSES: COOPERATIVE STOCHASTIC EFFECTS AND THE ANALYSIS OF SPIKE TRAINS

A. R. BULSARA and A. J. MAREN May 1993 14 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(AD-A270041) Avail: CASI HC A03

We can create a richer and more neurophysiologically realistic

model of neural activity in the brain by developing a model of neural-dendritic coupling, one which expressly accounts for the way in which the many afferent connections into the neural body influence the somatic membrane potential. Such a model would begin to fill the need within the Artificial Neural Network community for neural models which go beyond the current weighted sum paradigm for artificial neuron connectivity. Although such models have use in engineering applications, there are many aspects of biological neural-dendritic organization which could enrich artificial neural networks. Moving from simple axonal connection weight neural models to neural-dendritic models with a richer structure will allow investigation of both events at the neural level (e.g., inter-spike interval histograms and stochastic resonance) and also potentially at the neural systems level. This will also introduce the possibility of introducing cross-scale interactions into artificial neural systems. DTIC

N94-18862*# Massachusetts Inst. of Tech., Cambridge. Dept. of Brain and Cognitive Services.

STRATEGIES FOR ENHANCING CATECHOLAMINE-MEDIATED NEUROTRANSMISSION Final Technical Report

RICHARD J. WURTMAN 22 Sep. 1992 4 p

(Contract NAG2-210)

(NASA-CR-193807; NAS 1.26:193807) Avail: CASI HC A01/MF A01

Major findings made during this project period included the following observations: changes in tyrosine availability do affect brain dopamine release, as assessed by in vivo microdialysis, but that neuronal feedback mechanisms limit the durations of this effect except when dopaminergic neurotransmission has been deficient; the circulating hormone TRH markedly stimulates brain dopamine release, an effect probably mediated by its diketopiperazine metabolite; the amount of circulating L-dopa which enters the brain is both enhanced by carbohydrate consumption and suppressed by protein intake (both nutritional effects can be damaging, inasmuch as a sudden rush of L-dopa into the brain can facilitate dyskinesias, while the inhibition of brain L-dopa uptake by proteins suppresses its conversion to brain dopamine; an appropriate mixture of dietary proteins and carbohydrates can obviate both effects); serotonin release from superfused hypothalamic slices is a linear function of available tryptophan levels throughout the normal dynamic range; the daily rhythm in plasma melatonin levels is abnormal both in the sudden infant death syndrome and in women with secondary amenorrhea; tyrosine can potentiate the anorectic effects of widely-used sympathomimetic drugs; newly-described COMT inhibitors can enhance brain dopamine release in vivo; and a cell culture system, based on Y-79 (retinoblast) cells, exists in which melatonin reliably suppresses dopamine release. Author (revised)

N94-18911 State Univ. of New York, Plattsburgh. Auditory Research Lab.

THE EFFECTS OF REVERBERANT IMPULSE NOISE (BLAST WAVES) ON HEARING: PARAMETRIC STUDIES Midterm Report, 9 Sep. 1991 - 8 Mar. 1993

ROGER P. HAMERNIK 16 Jun. 1993 93 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DAMD17-91-C-1113)

(AD-A269242) Avail: CASI HC A05

This research is directed at studying the effects on the auditory system of exposure to high levels of reverberant impulse noise using an animal (chinchilla) model. The blast waves were generated by a three inch diameter shock tube (source III), which produced wave signatures having spectral energy concentrated in the 12 kHz region. The waves were discharged into a reverberant chamber within which animals were individually exposed. Animals were exposed to either 150, 155, or 160 dB peak SPL impulses. The number of impulses presented at each intensity was 1, 10, or 100, with repetition rates fixed at 1 impulse/sec. This parametric design yielded 9 groups of animals. There were 15 animals in each group. Brainstem evoked potentials were used to estimate temporary and permanent threshold shifts and conventional surface

preparations of the cochlea were used to quantitatively assess sensory cell loss. This midterm report presents the audiometric data and a portion of the histological data for the 136 animals that completed the exposure protocol. The audiometric and available histological data showed that damage to the auditory system systematically increased as the energy of the exposure was increased through manipulation of number of presentations or peak SPL. DTIC

N94-18936* National Aeronautics and Space Administration, Washington, DC.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 382)

Dec. 1993 51 p

(NASA-SP-7011(382); NAS 1.21:7011(382)) Avail: CASI HC A04

This bibliography lists 119 reports, articles, and other documents recently introduced into the NASA Scientific and Technical Information System. Subject coverage includes the following: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance. Author

N94-19069* National Aeronautics and Space Administration, Washington, DC.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 381)

Nov. 1993 46 p

(NASA-SP-7011(381); NAS 1.21:7011(381)) Avail: CASI HC A03

This bibliography lists 89 reports, articles and other documents introduced into the NASA Scientific and Technical Information System during Nov. 1993. Subject coverage includes: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance. Author

N94-19163*# Utah Univ., Salt Lake City.

CHARACTERIZATION OF FLUID PHYSICS EFFECTS ON CARDIOVASCULAR RESPONSE TO MICROGRAVITY (G-572)

GEORGE M. PANTALOS, M. KEITH SHARP, STEWART J. WOODRUFF, RICHARD D. LORANGE, THOMAS E. BENNETT (Bellarmine-Ursuline Coll., Louisville, KY.), JAN J. SOJKA (Utah State Univ., Logan.), and MARK W. LEMON (Utah State Univ., Logan.) In NASA. Goddard Space Flight Center, The 1993 Shuttle Small Payloads Symposium p 1-10 Oct. 1993
Avail: CASI HC A02/MF A03

The recognition and understanding of cardiovascular adaptation to spaceflight has experienced substantial advancement in the last several years. In-flight echocardiographic measurements of astronaut cardiac function on the Space Shuttle have documented a 15 percent reduction in both left ventricular volume index and stroke volume with a compensatory increase in heart rate to maintain cardiac output. To date, the reduced cardiac size and stroke volume have been presumed to be the consequence of the reduction in circulating fluid volume following diuresis and other physiological processes to reduce blood volume within a few days after orbital insertion. However, no specific mechanism for the reduced stroke volume has been elucidated. The following investigation proposes the use of a hydraulic model of the cardiovascular system to examine the possibility that the observed reduction in stroke volume may, in part, be related to fluid physics effects on heart function. The automated model is being prepared to fly as a GAS payload. The experimental apparatus consists of a pneumatically actuated, elliptical artificial ventricle connected to a closed-loop, hydraulic circuit with compliance and resistance elements to create physiologic pressure and flow conditions. The ventricle is instrumented with high-fidelity, acceleration-insensitive, catheter-tip pressure transducers (Millar Instruments) in the apex and base to determine the instantaneous ventricular pressures and $(\Delta P)_{(sub LV)}$ across the left ventricle ($LVP_{(sub apex)} - LVP_{(sub base)}$). The ventricle is also instrumented with a flow probe and pressure transducers immediately upstream of the

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inflow valve and downstream of the outflow valve. The experiment will be microprocessor controlled with analog signals stored on the FM data tape recorder. By varying the circulating fluid volume, ventricular function can be determined for varying preload pressures with fixed afterload pressure. Pilot experiments on board the NASA KC-135 aircraft have demonstrated proof-of-concept and provided early support for the proposed hypothesis. A review of the pilot experiments and developmental progress on the GAS version of this experiment will be presented. Author

N94-19523 Institut d'Aeronomie Spatiale de Belgique, Brussels.
THE BRAIN ELECTRICAL ACTIVITY IN DIFFERENT G SITUATIONS

K. DEMETZ (Antwerp Univ., Belgium.), O. QUADENS (Antwerp Univ., Belgium.), and M. DEGRAEVE 1993 19 p Submitted for publication Sponsored in part by National Foundation for Scientific Research, Belgium (ISSN 0065-3713)

(AERONAUTICA-ACTA-A-372-1993; ETN-93-94964) Copyright Avail: Issuing Activity (Institut d'Aeronomie Spatiale de Belgique, 3 Avenue Circulaire, B-1180 Brussels, Belgium)

The electrical activity of the brain was recorded during parabolic flights in trained astronauts and nontrained volunteers. It was quantified with the fast Fourier transform method. The electrical activity of the brain analyses evidenced more asymmetry between the two brain hemispheres in the subject who suffered from motion sickness than in the others. A first attempt was made to calculate the dimensionality of 'chaotic attractors' in the electrical activity of the brain patterns as a function of the different g-epochs of 1 parabola. This method allows us to discriminate between deterministic and stochastic events and to indicate trends. Preliminary results are given. ESA

N94-19593 East Carolina Univ., Greenville, NC.
EVALUATION OF DRIED STORAGE OF PLATELETS FOR TRANSFUSION: PHYSIOLOGIC INTEGRITY AND HEMOSTATIC FUNCTIONALITY Triannual Report No. 2

ARTHUR P. BODE 8 Oct. 1993 6 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract N00014-92-J-1244)

(AD-A270756) Avail: CASI HC A02

The meeting consisted of a review of all project findings to date (1989-present) to evaluate the prospects of commercialization of dried human platelets for transfusion. Data was presented to show the typical yields, retention of platelet integrity and function, and possible in vivo application. The discussion that proceeded was generally very favorable and supported a progression toward GMP/GLP large-scale production of pharmaceutical grade human platelet preparations as a next step. We view this outcome as a validation of our efforts. DTIC

N94-19608# Naval Health Research Center, San Diego, CA.
A COMPARISON OF POLYGRAPHIC AND ACTIGRAPHIC MONITORING OF SLEEP USING A 5-CHANNEL PROGRAMMABLE-SENSITIVITY ACTIGRAPH Final Report, 15 Nov 1990 - 14 Nov. 1992

TIMOTHY F. ELSMORE and PAUL NAITOH 30 Nov. 1992 62 p

(Contract MIPR-91MM1505)

(AD-A270731) Avail: CASI HC A04/MF A01

The purpose of this project was to investigate the utility of a new device, the AMA-32 actigraph, for monitoring the general activity of human subjects both during sleep and wake. In the first phase of the project, a software program for the analysis of AMA-32 data files was developed. In the second phase, the effects of frequency passband and threshold settings of the AMA-32 amplifier were examined in a 96-hour study. It was concluded that discrimination of sleep from wake was best with the 2-3 Hz passband, which emulates earlier-generation actigraphs, and that existing algorithms for automatic sleep scoring of actigraphs are not applicable to actigraph data collected with non-traditional

analog amplifier characteristics. Additional studies are needed to further explore the utility of the additional features offered by the AMA-32. DTIC

N94-19675# Naval Medical Research Inst., Bethesda, MD.
CEREBRAL ISCHEMIA AND REPERFUSION INJURY: A BRIEF REVIEW Technical Report, Dec. 1992 - May 1993

J. S. COLTON and S. L. POCOTTE Jul. 1993 31 p

(Contract DA PROJ. MR0-4101)

(AD-A270480; NMRI-93-55) Avail: CASI HC A03/MF A01

Cerebral injury, whether due to cardiac arrest, stroke, air embolism, head trauma, asphyxiation or cerebral edema, is a major medical challenge. The understanding of the basic physiology and biochemistry of brain damage helps lay a foundation for informed diagnosis and treatment, as well as the development of future intervention and treatment strategies. It is hoped that the review provides a useful collection of facts and concepts that can be integrated into a working understanding of brain injury induced by a compromised oxygen supply. This review is the result of an extensive literature search and compilation of information on ischemia and reperfusion injury. This information was used, in part, for the preparation and construction of a research preproposal on the same subject matter. DTIC

N94-19783# California Univ., San Diego, La Jolla. Dept. of Psychiatry.

EXTRATHALAMIC MODULATION OF CORTICAL FUNCTION

Final Technical Report, 1 Jul. 1990 - 30 Jun. 1993

STEPHEN L. FOOTE and JAIME A. PINEDA 15 Sep. 1993 12 p

(Contract AF-AFOSR-0325-90)

(AD-A270869; AFOSR-93-0784TR) Avail: CASI HC A03/MF A01

The overall goal of the proposed study is to characterize the effects of noradrenergic (NA) afferents on cortical information processing. Our previous studies indicate that the primate locus coeruleus (LC) system, originating in the pontine brainstem, innervates the neocortex more densely than previously thought, exhibiting highly specific patterns in terms of the regional and laminar distribution of its axons across the neocortex. Previous neurophysiological observations suggest that this highly divergent system imposes state-related modulatory effects on thalamo-cortical and cortico-cortical systems. For example, we have shown that primate LC-NA neurons are more active during waking than sleep and exhibit bursts of activity during increases in attentiveness. We have also previously demonstrated that the microiontophoretic application of NA to monkey auditory cortex neurons increases the selectiveness of their responses to auditory stimuli. DTIC

N94-19962# Air Force Inst. of Tech., Wright-Patterson AFB, OH. Foreign Aerospace Science and Technology Center.

ANALYSIS OF HEALTH STATUS FROM PRELIMINARY PHYSICAL EXAMINATION OF FLIGHT ACADEMY APPLICANTS

ZHI-YING ZHOU 30 Jul. 1993 15 p Transl. into ENGLISH from Chung-Hua Yu Fang i Hsueh Tsa Chih (China), v. 22, no. 4, Jul. 1988 p 241-244

(AD-A267759; FASTC-ID(RS)T-0732-92) Avail: CASI HC A03/MF A01

In March 1985, flight academy applicants selected from eight middle schools received physical examinations in Gong'an County. These male students' ages were between 16 and 19 years old. The overall disqualification percentage of the 416 persons, 64.18 percent were disqualified by the results of the physical examinations. 40.82 percent of the disqualifications were due to subnormal eye vision. In a follow-up investigation, it was found that in general there is substandard classroom lighting below normal illumination levels regulated by the Ministry of Public Health. These subnormal illumination levels have affected student visual acuity in varying degrees. Persons with scabies were amounted to 7.11 percent of all students, spread easily in most schools because of undesirable dormitory conditions. To improve student body

constitution, schools should emphasize education in student health maintenance and public health by paying attention to keeping their eyes healthy as well as eye exercises. Derived from text

N94-19981# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
PHYSIOLOGICALLY BASED PHARMACOKINETIC MODELLING OF PERCUTANEOUSLY ABSORBED DIBROMOMETHANE UTILIZING MULTIPLE DERMAL SUB-COMPARTMENTS M.S. Thesis
 CHRISTOPHER R. MCDANIEL Sep. 1993 70 p
 (AD-A271106; AFIT/ENC/GEE/93S-2) Avail: CASI HC A04/MF A01

The goal of this study was to develop a physiologically based pharmacokinetic (PBPK) model that predicts mammalian blood concentrations of dibromomethane following exposure by dermal absorption more accurately than a previously developed Homogeneous Dermal Model. The Homogeneous Dermal Model contains a dermal compartment with no dermal sub-compartments. The 1:1 Dermal Model developed in this research contains a dermal compartment with a stratum corneum and a composite dermal sub-compartment of equal volume. This model yields predictions which are 21.4 percent more accurate than the original homogeneous model. In order to represent skin anatomy more accurately, the 1:10 Dermal Model variation was developed. The 1:10 Dermal model contains a dermal compartment with a composite dermal sub-compartment ten times the volume of the stratum corneum sub-compartment. The 1:10 Dermal Model yields predictions which are 17.7 percent more accurate than the original model. Finally, the 1:3:7 Dermal Model was developed which contains a viable epidermis sub-compartment three times the volume of the stratum corneum sub-compartment and a composite dermal sub-compartment which is seven times the volume of the stratum corneum sub-compartment. This model yields predictions 27.7 percent more accurate than the original model. DTIC

N94-20022# Technische Univ., Berlin (Germany). Fachgruppe Computer Graphics.
A CONCEPT FOR IMPLEMENTING HYPERMEDIA TECHNOLOGY IN COMPUTER AIDED WORKPLACES IN MEDICINE Ph.D. Thesis [EIN KONZEPT FUER DEN EINSATZ DER HYPERMEDIATECHNIK AN COMPUTERGESTUETZTEN ARBEITSPLAETZEN IN DER MEDIZIN]
 MICHAEL HENKE 1993 214 p In GERMAN
 (ETN-93-95057) Avail: CASI HC A10/MF A03

A concept that allows medical personnel to structure the information about a patient is presented. It is assumed that the digital data is increasingly displacing the analog part and also that in addition to images, more and more other media (animation, video, text, graphics, charts etc.) will become an integral part of the digital patient folder. The result of the activities of the medical personnel that are involved in the patient's treatment is that there exists a strong relationship in the content of the documents which are created in that time. A report is related to medical images, a therapy plan is made on the basis of the diagnosis which refers to the reports and finally the results of the preliminary examination and the follow-up examination are compared for the purpose of therapy evaluation. Through a computer aided documentation of the relationship, that is by creating references between the documents of the patient folder, interdependencies will be easy to recognize and to duplicate later on. The aid that allows the connection of information in such a manner is realized with hypermedia technique. Through the application of the hypermedia technique, the structure of the patient folder results in a hypermedium. An expansion of this concept to several medical institutions gives additional advantages, such as comprehensive access to reference cases or the avoidance of repeated examinations. The success of the use of hypermedia techniques depends substantially on the design of the man machine communication. On the one hand new forms of interaction result from the demand to process multimedia data, on the other hand well designed user interfaces are needed to ensure an easy handling of the tools for creating and following up links. ESA

N94-20024 Technische Univ., Berlin (Germany). Fachbereich Elektrotechnik.

CALCULATION AND OPTIMIZATION OF ELECTROMAGNETIC FIELDS IN A PATIENT BY LOCAL HYPERTHERMIA UTILIZATION Ph.D. Thesis [BERECHNUNG UND OPTIMIERUNG ELEKTROMAGNETISCHER FELDER IM PATIENTEN BEI REGIONALEN HYPERTHERMIEANWENDUNGEN]
 JACEK NADOBNY 1993 168 p In GERMAN Sponsored by Deutschen Krebshilfe e.V., and Tech. Univ., Berlin, Germany
 Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
 (ETN-93-95059) Avail: CASI HC A08

Electric field intensities in an electrically inhomogeneous, lossy medium, near the source of the electromagnetic field, are calculated for estimation of the absorbed rate density distribution in human bodies. The volume surface integral equation formulation, in which a primary field is defined as the field put in the problem area, while the problem area is replaced by an inhomogeneous reference medium such as air is presented. Source distribution variations, due to reinstalled inhomogeneities, were defined as coupled sources and could be estimated as a problem part. The scatter field was defined as the difference between total and primary fields and was obtained as the sum of the fields generated by coupled sources and the polarization sources in the problem area. For numerical solution of equations, an iterative solver and a finite volume scheme were chosen. The method was tested from a medical point of view with an annular phased array, which creates an axially polarized electric field in the patient tumor; temperature distributions were obtained by liquid crystal thermography and compared with calculations; the good agreement shows that the method is a useful tool for an optimized hypermedia treatment.

ESA

N94-20045# East Carolina Univ., Greenville, NC. School of Medicine.

THE ROLE OF AXON-SCHWANN CELL INTERACTIONS IN NERVOUS SYSTEM IONIC HOMEOSTASIS Final Report, 1 May 1988 - 30 Apr. 1993

EDWARD M. LIEBERMAN 8 Jun. 1993 5 p
 (Contract DAAL03-88-K-0102)
 (AD-A270936; ARO-25752.10-LS) Avail: CASI HC A01/MF A01

The long term goal of the research program of this laboratory is to reach an understanding of the physiological interactions between neurons and their associated glia that relate to their ability to cooperatively regulate the ionic and neurohumoral milieu of the perineural and/or periaxonal space. To this end we have been investigating the mechanisms by which axons and neurons generate the chemical signals during their excitation that signals the glia to activate their metabolic and uptake processes that inactivate neurotransmitters preventing their accumulation to toxic concentrations and the transport of potassium and of sodium to maintain appropriate amounts of each ion in the perineural space thereby preserving excitability properties of the neural elements of the nervous system. For these investigations we have used the intact nerve fiber Schwann cell preparations of crayfish and squid to study nerve-Schwann cell interactions in intact systems and the mammalian Schwann cell culture to determine the generality of our findings to mammalian systems. DTIC

N94-20112 California Inst. of Tech., Pasadena.
TOWARD A NEUROBIOLOGICAL THEORY OF VISUAL ATTENTION Annual Report, 1 Sep. 1992 - 31 Aug. 1993

CHRISTOF KOCH 30 Sep. 1993 6 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
 (Contract F49620-92-J-0454)

(AD-A270724; AFOSR-93-0775TR) Avail: CASI HC A02

The investigators started the construction of a system-level simulation package incorporating the ideas of temporal tagging for attentional modulation of neuronal signals into a model of several interacting cortical and subcortical areas using video-camera acquired images. This simulation differs significantly

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from connectionist models, since the temporal structure of the neural signals plays a crucial role in the coding of attentional state. Thus, the simulation uses single neuron models with quasi-realistic temporal behavior. In particular, all models in which the activity of a neuron is measured only by average firing rate are excluded. Instead, the simulation assumes a spiking mechanism, and that the communication between neurons has to be accomplished by the exchange of potentials. DTIC

N94-20185# Tennessee Univ., Nashville. College of Engineering and Technology.

CENTER FOR NEURAL ENGINEERING Annual Progress

Report, 15 May 1992 - 14 May 1993

MOHAN J. MALKANI Jul. 1993 27 p

(Contract N00014-91-J-1372)

(AD-A271164) Avail: CASI HC A03/MF A01

The main objectives of the Center for Neural Engineering are: (1) to advance the understanding of biologically-motivated neural network systems through inter-disciplinary basic research; (2) to develop the highest quality undergraduate and graduate curricula in neural computing and engineering that will serve as a role model for other institutions; (3) to provide pre-graduate and post-graduate training for students in a nationally and internationally recognized basic and applied research and development environment focusing on critical present and future technologies; and (4) to broaden educational and career development opportunities for minorities and women. DTIC

N94-20190# Wichita State Univ., KS. National Inst. for Aviation Research.

EVALUATION OF HEAD INJURY CRITERIA

HAMID M. LANKARANI, SRINIVAS REDDY MALAPATI, and RAJIV MENON 1993 60 p

(NIAR-93-2) Avail: CASI HC A04/MF A01

Human safety is a major concern for those in airline industry and automobile industry. In order to improve the effectiveness and reduce the cost of vehicle safety, improved dummies and injury criteria are needed. A prerequisite for developing improved dummies is the development of injury tolerance of the human being to impacts like those caused in automobile accidents. One major problem of interest for aerospace and automotive designers is how to arrange seats, restraints and interior elements of a cockpit/cabin or a car to reduce the amount of passenger injury in specific types of collision situations. The use of Head Injury Criteria (HIC) in vehicle crash testing results in designing restraint systems. It is capable of predicting severity of human head injury. This knowledge can be applied to the development of improved design standards to reduce injuries in vehicle crash situations. According to the aerospace standards in designing seats, for civil rotor craft and transport airplanes HIC has to be evaluated during the tests on seats, and the results have to be included in the document. For these tests an anthropomorphic test dummy (ATD) shall be used to simulate each occupant. In this study an effort has been made to provide some details of the types of head injuries, the mechanisms associated with head injuries, some common definitions of terminologies related with head injuries, the historical development of various head injury criteria and their measures, some comparisons of the head injury criteria and computational aspects of head injury criteria. Derived from text

N94-20238 Royal Netherlands Meteorological Inst., De Bilt. **WIND CHILL: THE TEMPERATURE FEELING CAUSED BY THE WIND VELOCITY [WIND CHILL: DE DOOR DE WINDSNELHEID VEROORZAAKTE TEMPERATUURGEWAARWORDING]**

B. ZWART Nov. 1992 42 p In DUTCH

(ISSN 0169-1708)

(KNMI-TR-103A; ISBN-90-369-2029-9; ETN-94-94530) Avail:

Issuing Activity (Royal Netherlands Meteorological Institute, Postbus 201, 3730 AE De Bilt, Netherlands)

The loss of heat of a body by the combination of low temperatures and high wind velocities was studied for the period around mid January 1987 when the weather conditions were extreme for the Netherlands. The concepts of sensory or apparent

temperature and wind chill are introduced. The cooling speed of the body was determined with a Kata thermometer. The concepts of wind-chill equivalent and effective temperature are discussed. The effects of humidity and radiation on the apparent temperature are outlined. ESA

N94-20372* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

EXTRA-CORPOREAL BLOOD ACCESS, SENSING, AND RADIATION METHODS AND APPARATUSES Patent

KENT D. CASTLE, inventor (to NASA) 16 Nov. 1993 10 p Filed 16 Sep. 1991 Supersedes N92-11627 (30 - 2, p 289)

(NASA-CASE-MSC-21775-1; US-PATENT-5,261,874;

US-PATENT-APPL-SN-760633; US-PATENT-CLASS-604-4;

US-PATENT-CLASS-604-28; INT-PATENT-CLASS-A61M-1/03)

Avail: US Patent and Trademark Office

The described invention is related to extra-corporeal blood access and radiation methods and apparatuses and, in particular, to subjecting flowing blood to energy in variety of forms, including radiation, electromagnetic force fields or atomic particles. It is directed to methods and apparatuses for accessing flowing blood and for subjecting the blood to electrical conductive, electrostatic or electromagnetic fields or for radiating the blood with some type of radiation, e.g., radio waves, ultrasonic or audio waves, microwaves, IR rays, visible light, UV radiation, x-rays, alpha, beta or gamma rays. An apparatus is employed which includes one or more access ports or windows for radiating blood and/or for sensing/analyzing blood. This invention is useful for killing viruses and bacteria in blood, monitoring blood for medical purposes, genetic modification of blood, and analyzing and/or treating blood components.

Official Gazette of the U.S. Patent and Trademark Office

N94-20451*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

NUMERICAL MODELING FOR AN ELECTRIC-FIELD

HYPERTHERMIA APPLICATOR Abstract Only

TE-KAO WU, C. K. CHOU (City of Hope Medical Center, Duarte, CA.), K. W. CHAN (City of Hope Medical Center, Duarte, CA.), and J. MCDUGALL (City of Hope Medical Center, Duarte, CA.) *In its Progress In Electromagnetics Research Symposium (PIERS)* p 824 1993

Avail: CASI HC A01/MF A10

Hyperthermia, in conjunction with radiation and chemotherapy for treatment of cancers, is an area of current concern. Experiments have shown that hyperthermia can increase the potency of many chemotherapy drugs and the effectiveness of radiation for treating cancer. A combination of whole body or regional hyperthermia with chemotherapy or radiation should improve treatment results. Conventional methods for inducing whole body hyperthermia, such as exposing a patient in a radiant cabinet or under a hot water blanket, conduct heat very slowly from the skin to the body core. Thus a more efficient system, such as the three-plate electric-field hyperthermia applicator (EHA), is developed. This three-plate EHA has one top plate over and two lower plates beneath the patient. It is driven at 27.12 MHz with 500 Watts through a matching circuit. Using this applicator, a 50 kg pig was successfully heated to 42 C within 45 minutes. However, phantom and animal studies have indicated non-uniform heating near the side of the body. In addition, changes in the size and distance between the electrode plates can affect the heating (or electromagnetic field) pattern. Therefore, numerical models using the method of moments (MOM) or the finite difference time domain (FDTD) technique are developed to optimize the heating pattern of this EHA before it is used for human trials. The accuracy of the numerical modeling has been achieved by the good agreement between the MOM and FDTD results for the three-plate EHA without a biological body. The versatile FDTD technique is then applied to optimize the EHA design with a human body. Both the numerical and measured data in phantom blocks will be presented. The results of this study will be used to design an optimized system for whole body or regional hyperthermia. Author (revised)

N94-20462# Analytic Sciences Corp., Reading, MA.
OCULAR DAMAGE INDUCED BY ULTRASHORT LASER PULSES Interim Technical Report, Feb. - Jul. 1992
 JOSEPH A. ZUCICH, W. R. ELLIOTT, CLARENCE P. CAIN, GARY D. NOOJIN, and W. P. ROACH Sep. 1993 34 p
 (Contract F33615-92-C-0017)
 (AD-A271859; AL/OE-TR-1993-0099) Avail: CASI HC A03/MF A01

A study has been conducted of interaction effects and damage mechanisms of ultrashort laser pulses in the eye. The preliminary results reported here utilized rabbit subjects and ocular tissues isolated from the rabbit eye. Pulsewidths ranged from 4 ns down to 90 fs. In every case, a visible wavelength was used--either doubled Nd:YAG at 532 nm or the 580-nm output of a pumped dye laser. In the living subjects, we determined, for each pulsewidth, the threshold for minimally visible lesions (MVL's). In addition, we noted the energy doses required to induce hemorrhagic lesions relative to the corresponding MVL's and use these data to aid in the interpretation of the damage and energy dispersal mechanisms following absorption of ultrashort laser pulses. The ultrashort-pulse beam was directed through flat preparations of rabbit corneas and vitreous fluid and through intact rabbit lenses. Measurements were made to detect pulsewidth broadening or modulation, spectral broadening or white-light continuum generation, second-harmonic generation, and self-focusing or defocussing. These measurements, chosen as indicators of interactions as the ultrashort pulse passes through the ocular medium, were all negative. DTIC

N94-20615# Army Aeromedical Research Lab., Fort Rucker, AL.

CORONARY ANGIOGRAPHY OUTCOMES OF US ARMY AIRCREW WITH THE FINDING OF CORONARY ARTERY CALCIFICATIONS: AVIATION EPIDEMIOLOGY DATA REGISTER Final Report

KEVIN T. MASON, SAMUEL G. SHANNON, and PAUL V. CELIO
 Jul. 1993 38 p
 (AD-A271968; USAARL-93-28) Avail: CASI HC A03/MF A01

U.S. Army aircrew with a history of coronary artery calcification were identified by cardiac fluoroscopy, followed by coronary angiography, in the U.S. Army Aviation Epidemiology Data Registry for the period 1 January 1988 to 1 August 1992. Eighty-two aircrew met these criteria. Their angiography outcomes are summarized. The positive predictive value of cardiac calcifications for predicting any degree of coronary artery occlusion was 82.0%. The Framingham Risk Index, total serum cholesterol, cholesterol/HDL-cholesterol ratio, and results of the graded exercise treadmill test and thallium scan were not significant factors in predicting the angiography outcome when coronary artery calcifications were present. Aircrew in coronary artery disease screening programs should be examined for coronary artery calcifications by cardiac fluoroscopy and referred for coronary angiography if calcifications are seen. DTIC

N94-20624# Minnesota Univ., Duluth.
STUDIES OF NEURAL AND COGNITIVE FUNCTION IN SUBJECTS EXPOSED TO THE MARINE-AIR INTERFACE, PHASES 1 AND 2 Final Report

LORENTZ E. WITTMERS, JR. and RICHARD G. HOFFMAN 26 Oct. 1993 162 p
 (Contract N00014-88-K-0582)
 (AD-A272282) Avail: CASI HC A08/MF A02

In Phase 1 the effects of cold air (c), water (w), fatigue (f), and exercise (e) on physiological and psychological performance, and the effectiveness of several techniques for the suppression of shivering were investigated in 15 male subjects. Cold exposure was determined to be the most significant factor in reducing performance, causing significant reductions (p less than or equal to 0.05) in skin and rectal temperatures, temperature perceptions, shooting performance, grip strength, and dexterity both alone or when combined with any or all other factors. Cognitive performance, however was highest in the c/w/e/f, control, and c conditions, with the overall scores in the c/w, c/w/f and c/w/e conditions

significantly lower than control and c/w/e/f. Shivering gradually increased throughout exposure in cold conditions but was delayed in conditions which included exercise. Rectal temperatures increased during exercise, but later fell to the same level as in the non-exercise conditions. After 2+ hours of exposure 4 shiver-suppression techniques were applied: voluntary relaxation (R), breath holding (B), mental arithmetic (M), and warm water ingestion (W). Shivering was significantly suppressed by R, B, and M. In Phase 2 analysis of evoked potentials and reaction times during central and peripheral cooling indicated that cooling methods have differing effects on physiological and physical function. DTIC

N94-20627 Wright State Univ., Dayton, OH. Dept. of Psychology.

PERCEPTION/ACTION: AN HOLISTIC APPROACH 2 Annual Technical Report, Aug. 1992 - Aug. 1993

JOHN M. FLACH 12 Oct. 1993 17 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract F49620-92-J-0511)

(AD-A271822; WSU/TR/662238-39; AFOSR-93-0820TR) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

A general systems approach was used to study the emergent properties of the human perception/action system. Two task domains, the control of locomotion and the recognition of objects from dynamic occlusion, were used to study human performance. The locomotion task involved the control of altitude. Experimental results indicate that conflicting results from studies of altitude perception can be explained when global optical flow rate is considered. Optical analyses of the structure of flow fields, empirical results from human performance studies, and control theoretical analyses of the state space all converge to indicate that altitude and speed are not independent with respect to the problem of controlling locomotion in low altitude flight. In the dynamic occlusion task, the effects of time delays, visual noise, training, and instructions have been evaluated. The results tend to support the hypothesis that information was the critical determinant of performance in the dynamic occlusion task. Mode (active versus passive observer) was only important to the extent that it made additional information available to the observer. This conclusion is consistent with research on adaptation where the 'reafference hypothesis,' in which mode played an important role, is being replaced by the 'information hypothesis.' DTIC

N94-20928 Army Aeromedical Research Lab., Fort Rucker, AL.
REVIEW OF USING CARDIAC FLUOROSCOPY IN SYMPTOMATIC AND ASYMPTOMATIC PATIENTS Final Report

KEVIN T. MASON Aug. 1993 41 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DA PROJ. 3M1-62787-A-879)

(AD-A271690; USAARL-93-29) Avail: CASI HC A03

The history of methods to find coronary artery calcification is reviewed. Image-intensified cardiac fluoroscopy is the current method in general use for finding coronary artery calcifications. The technique of cardiac fluoroscopy is reviewed in detail. The findings of coronary angiography outcomes for symptomatic and asymptomatic populations with coronary artery calcifications are analyzed. There is a strong association between the finding of coronary artery calcification and the finding of anatomic coronary artery occlusions regardless of the patient's age or outcome of other cardiovascular disease tests. Patients with coronary artery calcifications are at a three-fold increased risk for premature mortality when followed over a five-year period. Clinicians should examine patients for coronary artery calcifications in stratified coronary artery disease screening programs. DTIC

N94-20935# Abcor, Inc., Wilmington, MA. Walden Research Div.

DEVELOPMENT AND DEMONSTRATION OF A PERSONAL MONITORING SYSTEM FOR EXPOSURE TO HYDROGEN FLUORIDE

52 AEROSPACE MEDICINE

M. S. YOUNG and J. P. MONAT 1993 98 p
(Contract DE-FG05-79EV-10249)
(DE93-041273; DOE/EV-10249/T1) Avail: CASI HC A05/MF A02

A good, functional Hydrogen Fluoride Gasbadge dosimeter has been developed for sampling of airborne HF vapor. The device is small (7.7 cm x 5.4 cm x 1.9 cm) and can easily and conveniently be worn on one's lapel. It consists of polyethylene and polypropylene parts and a triethanolamine-impregnated polypropylene collection element. It is completely self contained requiring no pumps, impingers, or sampling tubes. Subsequent to sampling, the collection element is analyzed quickly and easily with a fluoride selective-ion electrode. Laboratory tests were conducted to determine precision, linearity, interference effects, influences of temperature and humidity, and collection element stability over time. Results of the tests indicate that the Abcor Gasbadge HF dosimeter is an excellent passive HF monitor for work spaces, and that results obtained with it are accurate within +/- 25 percent. These results have been corroborated in a field study. DOE

N94-21035# Army Medical Center, Fort Gordon, GA.
NON-IONIC SURFACTANTS IN THE TREATMENT OF THIRD DEGREE BURNS Final Report, 1 Feb. 1990 - 31 Jul. 1993
JAMES C. MCPHERSON 1 Sep. 1993 35 p
(Contract MIPR-90-MM0544)
(AD-A271582) Avail: CASI HC A03/MF A01

Pluronic polyols are non-ionic surfactants developed in the 1950's. They are block co-polymers or the ABA type where A is made up of ethylene oxide polymers and B is propylene oxide polymers. They differ only in their molecular weight. The Pluronic polyols were shown to be non-toxic. This protocol evaluates their effect on third degree scald burn in a rat model, pluronic polyols were administered 30 minutes following a third degree scald burn to the chest of 300-320 gram male rats. Histological evaluation documented this burn. The Pluronic polyol was administered intravenously at a concentration of 12mm/1 with a dose of 8ml/kg body weight. Animals were followed for four weeks (complete healing). DTIC

N94-21036# Army Research Inst. of Environmental Medicine, Natick, MA.

MAXIMUM TEAM LIFTING CAPACITY AS A FUNCTION OF TEAM SIZE

MARILYN A. SHARP, VALERIE J. RICE, BRADLEY C. NINDL, and TANIA L. WILLIAMSON Oct. 1993 70 p
(AD-A271642; USARIEM-T94-2) Avail: CASI HC A04/MF A01

The relationship between the sum of individual lifts and team lifting capacity in two-, three-, and four-person teams was examined. Twenty-three men and 17 women were assigned to single and mixed-gender teams of two, three, or four persons. A weight-lifting bar was used to measure individual deadlift, as square device for two- and four-person lifting and a triangular device for three-person lifting. Team lifting capacity increased with team size and with the number of males on the team. Team lifting capacity as a percent of the sum of deadlift strength (% sum) did not change with an increase in team size beyond two. The %sum for teams of men (87.3%) was less than for teams of women (91.1%, p less than .05), and the %sums for single gender teams were both greater (p less than .01) than for mixed-gender teams (80.2%). The limits for lift set by Military Standard 1472D (1989) are well below the capabilities demonstrated here, and there is ample evidence in the Military Occupational Classification Structure (1990) that soldiers are required to lift heavier loads than recommended. Since soldiers are capable of and required to lift more than the recommended loads, consideration could be given to increasing these design limits. DTIC

N94-21134 Technische Hochschule, Darmstadt (Germany). Fachbereich Mathematik.

A GEOMETRICAL PROCESS FOR THREE DIMENSIONAL OSTEOTOMY PLANNING Ph.D. Thesis [GEOMETRISCHE VERFAHREN ZUR DREIDIMENSIONALEN OSTEOTOMIEPLANUNG]

MATTHIAS ECK 1991 139 p In GERMAN Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(ETN-93-93602) Avail: CASI HC A07

The possibilities of operation simulations with computer tomography before a bone operation are studied. An automatic algorithm was proposed for smoothing of digitalized datasets with an iterative formulation. Two algorithms are presented for data reduction, which are geometrical B-Spline curves and geometrical hermitian interpolation. Methods are described for bone surface reconstruction, which are based on Hardy multiquadrics. The well known implementation of experimental systems for planning of orthopedic operations were reviewed and two processes were developed in case of hip joint femur osteotomy, based on reconstructed computer tomography data, to estimate foreseeable member modifications before operations and to avoid or minimize them. ESA

N94-21141 Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Munich (Germany). Inst. fuer Strahlenschutz.
RADIOMETRY IN COMMERCIAL AIRCRAFT Final Report [STRAHMENMESSUNGEN IN VERKEHRSFLUGZEUGEN. ABSCHLUSSBEREICH]

D. REGULLA and J. DAVID Nov. 1991 88 p In GERMAN Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(ISSN 0721-1694)
(GSF-41/91; ETN-93-93458) Copyright Avail: CASI HC A05

Cosmic radiation exposure of pilots, aircrew, and passengers during commercial flights is studied as a function of flight altitude and geographic latitude. Radiation measurements were carried out aboard the German Lufthansa airlines with a mobile measuring laboratory equipped with photon and neutron radiation measuring instruments. Several routes were considered to examine pole, equator, and geomagnetism effects. A scintillation dosimeter was used for electron and photon detection and a Rem-counter was employed for neutron identification. Because measuring instruments were not calibrated under high radiation conditions, a tissue equivalent proportional counter was available. It is concluded that radiation exposure increases with altitude and geographic and geomagnetic latitude. ESA

N94-21209# Army Research Inst. of Environmental Medicine, Natick, MA.

HUMAN RESPONSES TO EXERCISE-HEAT STRESS Technical Report

MICHAEL N. SAWKA, C. BRUCE WENGER, and KENT B. PANDOLF Nov. 1993 96 p
(AD-A272581; USARIEM-TR-T94-3) Avail: CASI HC A05/MF A01

A comprehensive overview of the normal human physiological responses to environmental and exercise-related heat stress, with emphasis placed on acute heat exposure and acclimation produced by repeated heat exposure is provided. In addition, biomedical factors that modify exercise-heat tolerance such as aerobic fitness, dehydration, circadian patterns and sleep loss and medications are reviewed. Also, thermoregulatory responses of special populations such as women, blacks, children, older adults and spinal cord injured populations are reviewed. DTIC

N94-21288* National Aeronautics and Space Administration, Washington, DC.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 383)

Jan. 1994 43 p
(NASA-SP-7011(383); NAS 1.21:7011(383)) Avail: CASI HC A03
This bibliography lists 100 reports, articles, and other documents

introduced into the NASA Scientific and Technical Information System during Nov. 1992. Subject coverage includes the following topics: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance. Author (revised)

N94-21415# Louisville Univ., KY. Dept. of Surgery.
ENHANCEMENT OF WOUND HEALING BY BIOSYNTHETIC GROWTH FACTOR Midterm Report, 31 Jul. 1991 - 30 Jul. 1993

GREGORY L. BROWN and GREGORY S. SCHULTZ 30 Aug. 1993 147 p
 (Contract DAMD17-91-C-1095)
 (AD-A272517) Avail: CASI HC A07/MF A02

Our goal is to identify biological agents that play key roles in regulating normal healing, and using this knowledge, to develop methods to enhance wound healing. The major research focus has been centered on understanding the roles of peptide growth factors and proteases in normal wound healing. Fluids from healing human wounds contain extremely high levels of mitogenic activity; high levels of peptide growth factors including TGF- α , TGF- β , and IGF-I; and very low levels of proteolytic activity. In contrast, fluids from nonhealing ulcers contain low levels of mitogenic activity, low levels of growth factors, and very high levels of matrix metallo proteinases. Levels of EGF receptors also change during spontaneous healing of skin incisions. Thus, the molecular environment of healing wounds is radically different from the environment of chronic nonhealing wounds. We have utilized this knowledge to design rational combinations of growth factors and a new synthetic inhibitor of metallo proteinases (MMPI) that should improve healing of wounds. This combination of EGF and MMPI is undergoing testing in the pig skin graft model. If successful we will initiate a clinical trial with this formulation. We are also investigating TGF- β treatment to improve survival of irradiated skin flaps. DTIC

N94-21503# Bioelastics Research Ltd., Birmingham, AL.
DEVELOPMENT OF BIOELASTIC MATERIAL FOR ASPECTS OF WOUND REPAIR Triannual Progress Report, May - Aug. 1993

Aug. 1993 15 p
 (Contract N00014-90-C-0265)
 (AD-A272000) Avail: CASI HC A03/MF A01

For materials with possible use as wound coverings, control of the temperature of transition by changes in hydrophobicity will be examined. In addition, the rate of water passage through the matrix will be determined. The research approach is the stepwise coordination of the synthesis and characterization of the materials. The first application phase was concerned primarily with synthesis of the basic polypentapeptide poly(VPGVG) and the analog with L-alanine substituted in position 3, poly(VPAVG) and mole fraction combinations thereof to achieve elastomeric matrices of varying elastic moduli. And in the third year polypentapeptides containing chemical clocks are to be characterized for their rate of breakdown and their effects on drug release profiles. Derived from text

N94-21613# Department of Veterans Affairs, Washington, DC.
JOURNAL OF REHABILITATION RESEARCH AND DEVELOPMENT, VOLUME 30, NUMBER 1, 1993

1993 212 p
 (AD-A272956) Avail: CASI HC A10/MF A03

The Journal of Rehabilitation Research and Development, published quarterly, is a scientific rehabilitation engineering, research, and development publication in the multidisciplinary field of disability rehabilitation. General priority areas are: prosthetics and orthotics; spinal cord injury and related neurological disorders; communication, sensory, and cognitive aids; and gerontology. The journal receives submissions from sources within the United States and throughout the world. Only original scientific rehabilitation engineering papers will be accepted. Technical notes describing preliminary techniques, procedures, or findings of original scientific

research may also be submitted. Letters to the editor are encouraged. Books for review may be sent by authors or publishers. DTIC

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A94-12724
THE SAFE WORKING LOAD

MIKE GAINES Aerospace (UK) (ISSN 0305-0831) vol. 20, no. 10 Oct. 1993 p. 16-19.
 Copyright

The kind of workload usually associated with aircraft accidents is a 'serial' workload that results in fatigue; 'parallel' workloads due to excessive stimuli for crewmembers to cope with occur much less often. Analyses are here presented of human factors in air traffic control as well as aircrew physiological and psychological workload measuring techniques. Attention is given to the specific cases of workload levels in the cockpit of the Eurofighter 2000, airline crew workload, and air traffic control workloads. AIAA

N94-18657# Rice Univ., Houston, TX. Dept. of Psychology.
COMPARING PERFORMANCE ON IMPLICIT MEMORY TESTS Annual Technical Report, 1 Aug. 1992 - 31 Jul. 1993

HENRY ROEDIGER, III 1 Sep. 1993 11 p
 (Contract F49620-92-J-0437)
 (AD-A269900; AFOSR-93-0714TR) Avail: CASI HC A03/MF A01

During the past year grant related work has begun on five major projects and a similar number of projects less directly related to the original proposal, but still germane to it. Most of these concern the relation between measures of explicit and implicit memory performance, fulfilling the stated aims of the proposal. To cite some of our major findings during the first year of work, we have found that (1) priming on perceptual implicit memory tests can be boosted by imagery; (2) distinctive events that have powerful effects on explicit tests have little or no effect on perceptual priming; (3) a direct comparison of two methods for telling whether implicit memory tests are contaminated by conscious recollection both reveal that the tests are not contaminated, and (4) we have obtained some puzzling results (unlike those described above) which seem to indicate that repetition effects on implicit memory tests are more complicated than we had previously expected. Because we have just completed 12 months of a 36-month grant, some of the projects have not yet been completed. However, even after this first year, we plan to submit four papers on this work within the next few months. Most of the research conducted under the auspices of the grant has been at Armstrong Laboratories at Brooks AFB in San Antonio. This summer we have completed several pilot projects that will launch us on our second year's work at Armstrong Laboratories. Altogether, we tested some thirteen hundred subjects during the past year at Armstrong Laboratories, as well as several hundred more at Rice University, on these various projects. We believe we are making good progress toward our goals of the original proposal. DTIC

N94-18682# California Univ., Berkeley. Dept. of Psychology.
VISUAL PERCEPTION OF FEATURES AND OBJECTS Annual Report, 15 Mar. 1992 - 28 Feb. 1993

ANNE TREISMAN 19 Mar. 1993 14 p
 (Contract AF-AFOSR-0370-90)
 (AD-A269879; AFOSR-93-0713TR) Avail: CASI HC A03/MF A01

This period of grant support was used to continue experiments on the preattentive processing of features, focusing on the role of attention in the integration of information across opposite directions of contrast. While unicontrast dots can be integrated in parallel

across space and time to give rise to preattentive perception of either orientation or motion, attention seems to be required when the dots are of opposite contrast, consistent with the predictions of feature integration theory. A new method of dissociating preattentive and attentive processing through selective adaptation was explored. The second main area of research concerned perception and visual memory for novel objects, using priming tasks to discover the nature of the representations formed either automatically or with attention. We discovered a surprising combination of plasticity and persistence in implicit memory: Unattended novel patterns apparently leave memory traces that are formed in a single presentation but persist across at least 200 intervening trials with other similar patterns. Yet no conscious explicit memory is available even immediately after the presentation. DTIC

N94-18686# Naval Weapons Center, China Lake, CA.
**OPERATOR PERFORMANCE IN PATTERN MATCHING AS A
 FUNCTION OF REFERENCE MATERIAL STRUCTURE**
Summary Report, FY 1992 and 1993

MARION P. KIBBE and JAN S. STIFF Sep. 1993 31 p
 (AD-A269889; NAWCWPNS-TP-8145) Avail: CASI HC A03/MF
 A01

This report describes the results of two experiments that examine operator accuracies and response times to recognize matches and mismatches between line drawings and photographs. The line drawings used in the experiments were generated by the procedures used in the Land-Attack Multi-sensor Correlation (LMC), which is a targeting system under development at China Lake. The experiments varied the number of pixels in the line drawings, the manner in which the pixels were varied, and the kind of premission experience the operators had with the imagery. In addition, the performance results were used to demonstrate an approach that might be used to set a criterion score for calling out a match by the LMC. DTIC

N94-18744 Air Force Systems Command, Wright-Patterson AFB, OH. Armstrong Lab.

**PUTTING KNOWLEDGE TO USE: THE ACQUISITION AND
 TRANSFER OF KNOWLEDGE IN SITUATED PROBLEM
 SOLVING ENVIRONMENTS Final Report, Jan. 1989 - Dec.
 1992**

MICHAEL D. MCNEESE Jan. 1993 137 p Limited
 Reproducibility: More than 20% of this document may be affected
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 (Contract AF PROJ. 7184)
 (AD-A269746; AL/CF-TR-1993-0052) Avail: CASI HC A07

Within the areas of cooperative learning and group problem solving there has been great emphasis placed on the benefits of 'two heads being greater than one.' However, within each of these areas there is a lack of focus placed upon understanding naturalistic problems, the roles of metacognitive and perceptual expertise in collaboration, and the influence such factors have on transfer and use of knowledge from one situation to another. A research program is described which uses the Jasper series (a laser-disc based experimental macrocontext) to address these inadequacies and to investigate group-to-individual transfer in cooperative learning. The question asked is: 'What are the conditions in group collaboration which lead to a group member's use of knowledge as an individual?' Multiple statistical analyses were performed on various study components to clarify the relationships among individual and cooperative learning, collective induction, and the role of perceptual experience. Results highlight the different roles of perceptual context and collective induction in the knowledge acquisition/transfer process. Interpretation of the findings is given by proposing a situated cognition approach to problem solving. Finally, applications of the research suggest new forms of intelligent tutoring systems. DTIC

N94-19348 Katholieke Univ., Nijmegen (Netherlands). Inst. for
 Cognition and Information.

**SERIAL PATTERN COMPLEXITY: IRREGULARITY AND
 HIERARCHY**

P. A. VANDERHELM, R. J. VANLIER, and E. L. J.
 LEEUWENBERG 1993 47 p See also PB85-200574 and
 PB88-209911 Limited Reproducibility: More than 20% of this
 document may be affected by microfiche quality
 (PB93-191914; REPT-91-NICI-05) Avail: CASI HC A03

In perception research, various models have been designed for the encoding of e.g. visual patterns, in order to predict the human interpretation of such patterns. Each of these encoding models provides a few coding rules to obtain codes of a pattern, each code expressing regularity and hierarchy in that pattern. Some of these models employ the minimum principle which states that the human interpretation of a pattern is reflected by the simplest code of that pattern. That is, the simplest code according to a given complexity metric. The authors propose a new complexity metric. The metric is based on a formal analysis of the concept of regularity. Some conclusions of the analysis are sketched. The new metric accounts for the amounts of irregularity and hierarchy as represented in a code of a pattern, such that these two amounts can be added to determine the complexity of a code. NTIS

N94-19419 Institute for Perception RVO-TNO, Soesterberg
 (Netherlands). Skills Group.

**STIMULUS-DRIVEN CAPTURE AND ATTENTIONAL SET:
 SELECTIVE SEARCH FOR COLOR AND VISUAL ABRUPT
 ONSETS Final Report**

J. THEEUWES 25 Sep. 1992 22 p Sponsored by TNO
 Defence Research, Delft, Netherlands
 (IZF-1992-B-9; TD-92-2292; ETN-93-94926) Copyright Avail:
 Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769
 DE Soesterberg, Netherlands)

Recent evidence suggests that the occurrence of attentional capture is contingent on the attentional control setting induced by the task demands. The experiments on which these conclusions are based can be criticized for several reasons: the contingent capture hypothesis was tested by means of two visual search tasks in which subjects searched multielement displays in which a color singleton and onset singleton were simultaneously present. When subjects had to search for a color singleton, on some trials another location contained an irrelevant onset. When subjects had to search for an onset singleton, on some trials another location contained an irrelevant color singleton. Both experiments show that the contingent capture hypothesis does not hold: attention was captured by the most salient singleton. The results suggest a stimulus driven model of performance on which selection is completely determined by the properties of the objects present in the visual field. ESA

N94-19420 Institute for Perception RVO-TNO, Soesterberg
 (Netherlands). Skilled Behavior Group.

**EFFECTS OF PRACTICE IN SELECTING AND EXECUTING
 KEYPRESSING SEQUENCES Final Report**

W. B. VERWEY 7 Oct. 1992 38 p Sponsored by TNO
 Defence Research, Delft, Netherlands
 (IZF-1992-B-10; TD-92-2293; ETN-93-94927) Copyright Avail:
 Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769
 DE Soesterberg, Netherlands)

Three experiments that aimed at examining the effects of practice in a sequential keypressing task are described: in the first experiment a two choice sequence production task was practiced extensively. The second experiment assessed the effect of this practice on the production of a series of slightly changed sequences. In the third experiment a four choice reaction task was performed which included the practiced pair of sequences as well as a new pair in order to assess the effects of frequency of occurrence of each pair and their mutual similarity in terms of length and spatial layout. The results are used for the development of two sequence execution mechanisms. One allows programming to continue while the earlier keypresses in the sequence are already executed. The other allows unpacking of individual motor elements from a short term motor buffer during execution of the preceding keypresses. Practice with consistent stimulus sequence mappings made performance less sensitive to the presence of similar

sequences than practice with varied mappings which suggests that stimulus sequence associations develop with consistent stimulus sequence mapping. ESA

N94-19422 Institute for Perception RVO-TNO, Soesterberg (Netherlands). Skilled Behavior Group.

A FORTHCOMING KEY PRESS CAN BE SELECTED WHILE EARLIER ONES ARE EXECUTED Final Report

W. B. VERWEY 20 Jan. 1993 24 p Sponsored by TNO Defence Research, Delft, Netherlands (IZF-1993-B-2; TD-92-3202; ETN-93-94929) Copyright Avail: Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769 DE Soesterberg, Netherlands)

The issue of selecting a response while executing earlier response movements is addressed. Although there is the general notion that this may be possible, there is no conclusive evidence on whether it can occur without interference. A direct test of whether concurrent response selection and execution of previous responses develops with practice was carried out by having subjects press a number of keys, determined in advance, prior to pressing a stimulus dependent key. Response selection demands were varied by utilizing spatially compatible and incompatible stimulus response mappings the demands of which are known not to diminish much with practice. The results show that the longer time needed to select an incompatible response vanishes almost entirely when the stimulus dependent response is preceded by two and four predetermined key presses. The conclusion is drawn that response selection can concur with the execution of movement sequences without interference. ESA

N94-19439 Institute for Perception RVO-TNO, Soesterberg (Netherlands). Work Environment Group.

PILOT STUDIES ON OBJECT MOTION PERCEPTION DURING LINEAR SELF-MOTION AFTER LONG DURATION CENTRIFUGATION OF HUMAN SUBJECTS Final Report

A. H. WERTHEIM 1 Feb. 1993 33 p Sponsored by TNO Defence Research, Delft, Netherlands (IZF-1993-B-3; TD-92-3203; ETN-93-94930) Copyright Avail: Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769 DE Soesterberg, Netherlands)

Four experiments are reported. They were carried out to investigate whether a particular experimental paradigm to investigate the effects of long duration centrifugation of human subjects could be used and optimized. The method involved the psychophysical measurement of visual thresholds for perceiving object motion during self motion on a linear track sled. The experiments were of a preliminary nature and definite conclusions as to their theoretical interpretation can not be drawn. Two hypotheses can be underlined: according to the first hypothesis, long duration centrifugation affects the way in which visual information interacts with otolith reactivity; according to the second hypothesis, subjects who rely largely on visual information for a correct percept of egomotion are more susceptible to centrifuge induced sickness than others. ESA

N94-19440 Institute for Perception RVO-TNO, Soesterberg (Netherlands). Information Processing Group.

COGNITIVE ABILITY AND WHOLE-BODY ROTATION Final Report

L. C. BOER 3 Mar. 1993 25 p Sponsored by TNO Defence Research, Delft, Netherlands (IZF-1993-B-4; TD93-0371; ETN-93-94931) Copyright Avail: Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769 DE Soesterberg, Netherlands)

A series of studies examining how whole body rotation affects cognitive processing is summarized, and a new experiment is described. The main question was whether rotations of the body capture attention and reduce cognitive processing capacity. An additional question was whether the attention caught is resource specific, that is, whether particular cognitive capacities are more affected than others. Previous experiments revealed that cognitive processing comes to a complete standstill while body rotations are made actively on a swivel chair. The duration of the suspension

depended on the nature of the cognitive task, suggesting resource specificity. In the present experiment a rotating chair was used on which subjects were rotated while performing on spatial and nonspatial tasks. Performance losses were small and limited to the spatial task. The conclusion based on the whole series of experiments is that body rotations capture general as well as specific processing capacity, but that the amount of capacity caught is small, or the duration of capacity capture is short. Large attention capture is expected only if subjects execute the rotations actively. The striking similarity with the effects of eye movements on cognitive processing suggests that the active search for new information in the visual environment is the real reason why whole body rotation can be so disturbing. ESA

N94-19443 Institute for Perception RVO-TNO, Soesterberg (Netherlands). Skilled Behavior Group.

EFFECTS OF LOCATION CUEING ON REDUNDANT TARGET PROCESSING Final Report

J. THEEUWES 6 Jan. 1993 14 p Sponsored by TNO Defence Research, Delft, Netherlands (IZF-1993-B-1; TD-92-3197; ETN-93-94932) Copyright Avail: Issuing Activity (TNO Institute for Perception, Kampweg 5, 3769 DE Soesterberg, Netherlands)

Redundancy gain is discussed. It is observed that subjects respond faster to simultaneously presented redundant targets than to single targets. This finding is usually interpreted as evidence for parallel, self terminating, unlimited capacity processing. It is claimed that the reaction time advantage with redundant targets is simply due to spatial uncertainty under single target conditions. The present study tested this hypothesis. Subjects responded when one, two or three letter E's were presented, and refrained from responding when one, two or three letter F's were presented. On half of the trials, location uncertainty was eliminated by presenting a line segment at one of the locations of the subsequently appearing target letters. The results reject the alternative spatial uncertainty explanation: even when the location of the impending target is cued in advance, there is no attenuation of the redundancy gain. ESA

N94-19649# Technische Univ., Berlin (Germany). Fachbereich Verkehrswesen.

MODELING OF DRIVER BEHAVIOR: INFORMATION PERCEPTION, RULE AND CONTROL STRATEGIES IN EXPERIMENTS AND SIMULATIONS Ph.D. Thesis [MODELLIERUNG DES FAHRERVERHALTENS: INFORMATIONSAUFNAHME, REGEL- UND STEUERSTRATEGIEN IN EXPERIMENT UND SIMULATION] MIHAELA NECULAU 1992 112 p In GERMAN (ETN-93-95053) Avail: CASI HC A06/MF A02

For modeling several aspects of driver behavior, such as controllability and information processing, driver, vehicle, and environment are included in a system. The optimal control model was used as the theoretical basis. A vehicle model is developed, which involves longitudinal and transverse dynamics; nonlinear characteristics line for the motor moment and dynamic wheel loading were assumed; peripheral forces were separately calculated for rolling and braking. The street contour was represented in fixed coordinates with a parameter dependent curvature variation. The driver was assumed to have an internal model of the effects of his actions and to be able to estimate distances and relative angle variations; he must have a spatial representation of observed objects location and their relative position. Modern cognitive psychology theories were used for describing information subjective interpretation and its consequences on information processing modeling. Measured data used for model validation were extracted from tests of rally driver performances. It is concluded that the model is a powerful simulation tool for engineers, as far as it allows standard maneuvers to be represented. ESA

N94-19677# Battelle Memorial Inst., Columbus, OH. **INTEGRATED MEASUREMENT OF CREW RESOURCE MANAGEMENT AND TECHNICAL FLYING SKILLS Final Report, Feb. 1992 - May 1993**

53 BEHAVIORAL SCIENCES

GEORGE L. KEAMPF and DAVID W. KLINGER Aug. 1993
114 p
(AD-A270512; DOT/FAA/RD-93/26; DOT-VNTSC-FAA-93-6)
Avail: CASI HC A06/MF A02

The findings of a study designed with the objectives to produce a prototype performance measurement instrument (PMI) that integrates the assessment of Crew Resource Management (CRM) and technical flying skills and to investigate the suitability of the Critical Decision Method (CDM) for eliciting expert information concerning performance measurement are presented. The work was funded by the FAA in support of the Advanced Qualification Program (AQP) and conducted in cooperation with a major U.S. carrier. The researchers used CDM to identify critical components of performance assessment for specific flight tasks and developed a prototype PMI. The instrument contains two sections for each task. One section allows an evaluator to record significant pilot and crew behaviors observed; the second section allows the evaluator to provide a subjective assessment of pilot and crew proficiency. The researchers pretested the instrument and made revisions based on recommendations from experienced instructors. The researchers then evaluated the PMI with eight instructors observing a total of 16 different flight crews in recurrent training, performing a standard Line Oriented Flight Training (LOFT) scenario in a flight simulator. The instructors reliably and accurately employed the PMI to assess performance of the crew and the individual pilot. The authors recommended that AQP developers use Cognitive Task Analysis (CTA) techniques to develop training programs for cognitive and team tasks. DTIC

N94-20023 Southeastern Center for Electrical Engineering Education, Inc., Saint Cloud, FL.
DEVELOPMENT OF THE UTC-PAB NORMATIVE DATABASE Final Report, Jun. 1990 - May 1992
ROBERT E. SCHLEGEL, KIRBY GILLILAND, and MARK S. CRABTREE Oct. 1992 284 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality (Contract F33615-88-D-0532)
(AD-A271319; AL-TR-1992-0145) Avail: CASI HC A13

This report summarizes the development of a comprehensive normative database for a large subset of tasks from the Unified Tri-Service Cognitive Performance Assessment Battery (UTC-PAB). Tasks were selected from the AGARD STRES, CTS, and Walter Reed batteries. Data were collected by the University of Oklahoma and Armstrong Laboratory. All data were analyzed at the University of Oklahoma to address issues related to task reliability, comparability of tasks across batteries, group vs. individual test administration, order of task presentation and battery sequence, test-retest time intervals, imposition of response deadlines, extended trial lengths, and the usefulness of psychometric state measures. With few exceptions, the data showed remarkable consistency across task batteries and within task types. Task reliability varied as a function of the dependent measure. CTS data showed good correspondence to a previous large-scale CTS database. Task presentation order and battery sequence did not influence task performance. Response deadlines provided a faster mean response time, but at the expense of more missed responses. Extended trial lengths had a more profound effect on continuous motor tasks such as Unstable Tracking. Changes in the psychometric state measures of sleepiness and mood were local reflections of time on task. DTIC

N94-20081# Oklahoma Univ. Health Sciences Center, Oklahoma City. Civil Aeromedical Inst.
PSYCHOLOGICAL CORRELATES OF STRESS-INDUCED DECREMENTS IN HUMAN PERCEPTUAL PERFORMANCE Final Report
GARNET A. MCLEAN (Federal Aviation Administration, Oklahoma City, OK.), LANDGRAVE T. SMITH, TIMOTHY J. HILL, and CARL J. RUBENSTEIN Nov. 1993 13 p
(Contract DAMD17-83-C-3194)
(DOT/FAA/AM-93/19) Avail: CASI HC A03/MF A01

Stress-induced changes in human performance have been thought to result from alterations in the 'multidimensional arousal

state' of the individual, as indexed by alterations in the physiological and psychological mechanisms controlling performance. Identification of such changes in substrate activities provide more complete descriptions of both the performance changes and the arousal state/mechanisms. Decrements in perceptual performance were produced by independent and combined administration of atropine, sleep loss, and exercise for both a visual aircraft identification task and an auditory vigilance task; measurements of performance changes were accompanied by state measures of cardiovascular function, pupillary diameter, sleep onset latency, and subject self reports. Observed performance changes were accompanied by monotonic increases in heart rate after atropine and exercise, but not sleep loss. Moderate exercise produced blood pressure changes indicative of physical workload, but only atropine increased diastolic blood pressure and pupillary diameter relative to performance effects. Atropine and sleep loss each reduced sleep onset times to less than 50 percent control values (p is less than .0001); when combined with exercise, sleep onset times were reduced further (p is less than .03). These reductions in general arousal were confirmed by subject self-reports of reduced attentiveness and competence. These state measures of organismic function were found to be discriminatively correlative, but not predictive, of the decrements in perceptual performance seen; however, practical combinations of appropriate real-time measurement techniques could be developed that would promote the telemetering of human physiological activity to signal performance breakdown. Author (revised)

N94-20168# College of William and Mary, Williamsburg, VA.
INCONGRUITY, INCONGRUITY RESOLUTION, AND MENTAL STATES: THE MEASURE AND MODIFICATION OF SITUATIONAL AWARENESS AND CONTROL Final Report, 1 Jun. 1991 - 31 May 1993
PETER L. DERKS and LYNN S. GILLIKIN 1 Jul. 1993 97 p
(Contract NCC1-160)
(NASA-CR-194568; NAS 1.26:194568) Avail: CASI HC A05/MF A02

The research reported here describes the process of induction of various mental states. Our goals were to measure and to manipulate both the behavioral and the neurological correlates of particular mental states that have previously been demonstrated to be either beneficial or deleterious to in-flight performance situations. The experimental paradigm involved developing a context of which the participants were aware, followed by the introduction of an incongruity into that context. The empirical questions involved how the incongruity was resolved and the consequent effects on mental state. The dependent variables were measures of both the short-term ERP changes and the longer-term brain mapping indications of predominant mental states. The mission of NASA Flight Management Division and Human/Automation Integration Branch centers on the understanding and improvement of interaction between a complex system and a human operator. Specifically, the goal is improved efficiency through better operative procedures and control strategies. More efficient performance in demanding flight environments depends on improved situational awareness and replanning for fault management. Derived from text

N94-20467 New York Univ., New York.
COGNITION AND THE BRAIN: A CONTINUATION OF THE UNIVERSITY RESEARCH INITIATIVE AT NEW YORK UNIVERSITY Final Report, 15 Feb. 1990 - 14 Feb. 1993
LLOYD KAUFMAN 19 Oct. 1993 10 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0221-90)
(AD-A271872; AFOSR-93-0818TR) Avail: Issuing Activity
(Defense Technical Information Center (DTIC))

The main focus of this project was to make use of magneto-encephalographic (MEG) measures of brain activity to determine how the brain's neural resources are deployed during various cognitive tasks entailing different degrees of mental workload. Our laboratory pioneered this field, and the methods it

devised are presently in wide use in clinical applications, as well as in other research laboratories. We initiated the use of a simple procedure to fit observed extracranial field patterns to fields that would be produced by equivalent current dipoles. The ideal dipole's position, orientation, and strength (current dipole moment) was adjusted until its field pattern matched that of the observed pattern. This is a primitive form of what we now refer to as Magnetic Source Imaging (MSI). It is still the basic method in clinical applications, but a more sophisticated form of MSI is now emerging, largely as a result of work on this project. DTIC

N94-20520# Rochester Univ., NY. Dept. of Computer Science.
HEAD-CENTERED ORIENTATION STRATEGIES IN ANIMATE VISION

ENRICO GROSSO and DANA H. BALLARD Oct. 1992 25 p
(Contract NIH-1R24RR06853)
(TR-442) Avail: CASI HC A03/MF A01

This paper is about orienting, that is, establishing and maintaining a spatial relation between a motorized pair of cameras (the eye-head system) and a static or a moving object tracked over time. Motivated by physiological evidence, the paper proposes a simple set of vision-based strategies aimed to perform head, eyes and body movements in a complex environment. Fixation is shown to be an essential feature in visual servoing, and it is used to decouple control on head rotational degrees of freedom, making possible a metric-less approach to the orientation problem. A running implementation of these strategies, using a binocular camera system mounted on a PUMA 700, demonstrates the effectiveness of the approach. Author

N94-20610 Bolt, Beranek, and Newman, Inc., Cambridge, MA.
RESEARCH, DEVELOPMENT, TRAINING, AND EVALUATION (RDTE) SUPPORT DELIVERY ORDER 1: COMPUTATIONAL COGNITIVE MODELS Final Report, Mar. 1992 - Apr. 1993
STEPHEN E. DEUTSCH, EVA HUTLICKA, MARILYN J. ADAMS, and CARL E. FEEHRER Sep. 1993 82 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract F33615-91-D-0009)
(AD-A271837; AL/HR-TR-1993-0072) Avail: CASI HC A05

This document reports on work associated with the three-phase development of a psychologically-based human performance process model that can be used in the assessment of system performance. The first phase produced a preliminary architecture consisting of two parts: a 'mass memory' composed of long term memory structures that supported associative activation, and a set of sensory, perceptual, cognitive, and motor agents that communicated via message passing - writing messages to or reading messages from the mass. Phase two produced a revised architecture in which the distinction between memory and process disappeared and the resulting structures became active processing elements in a data flow structure. The addition to model development, certain activities associated with enroute air traffic control were also decomposed in order to develop the basis for a scenario within which to prototype, program, and test aspects of the revised model. The activities selected provided an opportunity to model single and multitasking behaviors and performance. DTIC

N94-21237# Defense Systems Management School, Fort Belvoir, VA.

A DESCRIPTION OF PSYCHOLOGICAL TYPE AT THE DEFENSE SYSTEMS MANAGEMENT COLLEGE, 1993 EDITION
CARL BRYANT, WILLIAM H. CUMMINGS, DANIEL B. CHAPLA, DONALD S. FUJII, and MARY-JO HALL 1993 31 p
(AD-A271612) Avail: CASI HC A03/MF A01

This paper describes the psychological type, as measured by the Myers-Briggs Type Indicator, of a representative sample of more than 3,700 students who attended the Defense Systems Management College (DSMC) since 1985. This study addresses the contributions and potential pitfalls that personnel with each Myers-Briggs Type bring to an organization, and implications for leaders who must work in a possibly changing work force. This

descriptive analysis may enable all who work in the defense acquisition environment to understand their coworkers better and, in this understanding, to enhance the overall acquisition process. DTIC

N94-21262# California Univ., Los Angeles.
PSYCHOMETRIC DEVELOPMENTS RELATED TO TESTS AND SELECTION

BENGT O. MUTHEN Aug. 1993 7 p
(Contract N00014-93-1-0619)
(AD-A272971) Avail: CASI HC A02/MF A01

Recent theoretical developments in the areas of latent variable modeling, random coefficient modeling, multilevel modeling, missing data theory, and empirical Bayes estimation provide interesting research opportunities for the psychometric modeling of the relationship between job performance and test performance. These developments suggest new approaches to the assessment of predictive validity of tests as well as to problems of selection and assignment. The purpose of the project is to use these theories as a basis for developing new psychometric methods that have the potential for better understanding the predictive validity of tests like the ASVAB and improving the selection and assignment of recruits for military jobs. DTIC

N94-21434 Navy Personnel Research and Development Center, San Diego, CA.

EXTRACTING INFORMATION FROM WRONG ANSWERS IN COMPUTERIZED ADAPTIVE TESTING Final Report, Oct. 1988 - Sep. 1991

J. B. SYMPSON Oct. 1993 32 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A272832; NPRDC-TN-94-1) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

A brief review of the history of polychotomous (i.e., multi-category) item response models is provided. After describing a new polychotomous item response model (Model 8), examples of the Operating Characteristic Functions obtained when Model 8 is applied to real test data are given. In general, inspection of 'goodness-of-fit' plots indicates that Model 8 provides superior data fit and higher item information functions than the well-known 3-parameter logistic (dichotomous) item response model. A simulation of computerized adaptive testing (CAT) that used the actual item responses of applicants for military enlistment shows that Model 8 would be superior to the 3-parameter logistic model in a CAT environment. In this investigation, Model 8 increased test reliability by an amount that is equivalent to a 25% increase in test length. DTIC

N94-21510# American Inst. for Research, Washington, DC.
COMPATIBILITY EVALUATION AND RESEARCH ON THE COMPUTERIZED ADAPTIVE SCREENING TEST (CAST): USER AND PROGRAMMER'S GUIDE Final Report, Oct. 1989 - Jan. 1991

RANDOLPH K. PARK and MICHAEL L. DUNN Oct. 1993 32 p
(Contract DAAL03-86-D-0001)
(AD-A273112; ARI-RN-94-01) Avail: CASI HC A03/MF A01

The Computerized Adaptive Screening Test (CAST) is used for predicting performance on the Armed Forces Qualification Test (AFQT). The goal of this project is to ensure CAST compatibility with the Electronic Information Delivery System (EIDS) now being fielded by the U.S. Army Recruiting Command. A number of software enhancements were implemented. Improvements were made in test item selection, reporting capability, experimental item selection, data storage capability, and software coordination. This report is a guide for users and programmers. DTIC

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A94-12000* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

VISUAL CUES IN FLIGHT SIMULATION - AN EVALUATION OF STEREO EFFECTIVENESS

WALTER W. JOHNSON (NASA, Ames Research Center, Moffett Field, CA), ANTHONY D. ANDRE (Western Aerospace Labs., Inc., Monte Sereno, CA), and RONALD V. KRUK (CAE Electronics, Ltd., Montreal, Canada) Oct. 1992 7 p. SAE, Aerotech '92 Conference, Anaheim, CA, Oct. 5-8, 1992 Research supported by U.S. Army refs (Contract NCC2-486) (SAE PAPER 921981) Copyright

The purpose of the present study was to quantify the effects of visual scene information on precision hovering tasks under biocular and stereo viewing conditions in a rotorcraft helmet-mounted display simulator. Four NASA test pilots performed a series of precision hover maneuvers in the context of three different scene contents, two ground textures, and three levels of control configuration difficulty. The results revealed that vertical position variability was greatest when vertical cues were absent, and that patterned ground texture aided hover stability only when other position-reference cues were absent from the scene. The stereo viewing condition showed no uniform advantages over the biocular condition. The results are discussed in terms of their implications for simulator design and qualification.

Author (revised)

A94-12623

COMMAND, CONTROL AND COMMUNICATIONS - THE HUMAN ROLE IN MILITARY C3 SYSTEMS

G. A. CLAPP (U.S. Navy, Naval Oceans Systems Center, San Diego, CA) and D. D. SWORDER (California Univ., La Jolla) In Control and dynamic systems. Vol. 52 - Integrated technology methods and applications in aerospace systems design San Diego, CA Academic Press, Inc. 1992 p. 513-541. refs Copyright

The paper describes some recent results in C3-system modeling with emphasis on the dynamics of human decision making. Particular attention is given to the architecture of a C3 concept, algorithms, and communications; the role of the human decision maker in C3; the features of the dynamic encounter; the decision maker's observation structure; the unimodal algorithm and the estimation algorithms; and the mission directed decision maker model. AIAA

N94-18484*# Lockheed Missiles and Space Co., Sunnyvale, CA.

LUNAR BASE CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM (LCELSS): PRELIMINARY CONCEPTUAL DESIGN STUDY Final Report

STEVEN H. SCHWARTZKOPF 30 Apr. 1991 207 p (Contract NAS9-18069) (NASA-CR-188479; NAS 1.26:188479; LMSC-F280196) Avail: CASI HC A10/MF A03

The objective of this study was to develop a conceptual design for a self-sufficient LCELSS. The mission need is for a CELSS with a capacity to supply the life support needs for a nominal crew of 30, and a capability for accommodating a range of crew sizes from 4 to 100 people. The work performed in this study was nominally divided into two parts. In the first part, relevant literature was assembled and reviewed. This review identified LCELSS performance requirements and the constraints and advantages confronting the design. It also collected information

on the environment of the lunar surface and identified candidate technologies for the life support subsystems and the systems with which the LCELSS interfaced. Information on the operation and performance of these technologies was collected, along with concepts of how they might be incorporated into the LCELSS conceptual design. The data collected on these technologies was stored for incorporation into the study database. Also during part one, the study database structure was formulated and implemented, and an overall systems engineering methodology was developed for carrying out the study. Author

N94-18673# Air Force Inst. of Tech., Wright-Patterson AFB, OH. Foreign Aerospace Science and Technology Center.

RESEARCH ON MAN-MACHINE PRODUCTIVITY IN AVIATION AT HUMAN ENGINEERING INSTITUTE OF HANGZHOU UNIVERSITY

WENXIONG JIN, ZUXIANG ZHU, and JIAN WANG 6 Aug. 1993 14 p Transl. into ENGLISH from Guoji Hangkong, China, no. 4, 1991 p 55-57 (AD-A269952; FASTC-ID(RS)T-0851-92) Avail: CASI HC A03/MF A01

The Human Engineering Research Institute of Hangzhou University is a scientific research organization engaged in research on the interdiscipline between psychology and technology. In recent years, ergonomic research on the fundamental theories and applications of man-machine productivity--regarding aircraft instrumentation lighting, displays, and controls; warning signals; computer terminal displays; human reliability; human body measurements; as well as management and decision making--was carried on. DTIC

N94-18730# Department of the Navy, Washington, DC.

CONDUCTIVE GARMENTS TO PREVENT RADIO-FREQUENCY (RF) BURNS Patent Application

RICHARD G. OLSEN, inventor (to Navy) 14 Jun. 1993 13 p (AD-D015832; US-PATENT-APPL-SN-076062) Avail: CASI HC A02/MF A01

This invention relates to protective garments to prevent radio-frequency (RF) burns. More particularly, this invention relates to conductive gloves, socks and other clothing that dissipate RF charges and thereby prevent RF burns. DTIC

N94-18754 Human Resources Research Organization, Alexandria, VA.

BUILDING A JOINT-SERVICE CLASSIFICATION RESEARCH ROADMAP: CRITERION-RELATED ISSUES Final Report, Jan. 1992 - Apr. 1993

DEIRDRE J. KNAPP and JOHN P. CAMPBELL Jul. 1993 98 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality (Contract F33615-91-C-0015) (AD-A269735; AL/HR-TP-1993-0028) Avail: CASI HC A05

The Air Force Armstrong Laboratory, the Army Research Institute, the Navy Personnel Research and Development Center, and the Center for Naval Analyses are committed to enhancing the overall efficiency of the Services' selection and classification research agenda. This means reducing redundancy of research efforts across Services and improving inter-Service research planning, while ensuring that each Service's priority needs are served. The Roadmap project is composed of six tasks. The first task identified classification research objectives. Tasks 2 through 5 consist of reviews of specific predictor, job analytic, criterion, and methodological needs of each of the methods and issues as they relate to the selection and classification research objectives outlined in Task 1 of the Roadmap project. DTIC

N94-18765# Logistics Management Engineering, Inc., Warminster, PA. Systems Engineering Group.

ARMY COCKPIT DELETHALIZATION PROGRAM (CDP) Final Report, Oct. 1989 - Dec. 1992

RICKY L. GRETH, MARK S. PFAFF, and W. B. SHOPE Aug. 1993 75 p

(Contract DAAJ02-89-C-0017)

(AD-A268990; CDP-871-041-A005; USAATCOM-TR-93-D-2)

Avail: CASI HC A04/MF A01

Injury data indicate that secondary cockpit strikes to the head and upper torso account for approximately two-thirds of all major and fatal injuries in potentially survivable Army helicopter mishaps. A two-year program of research, biodynamic simulation, detail design, test, and evaluation was performed to examine the head/upper torso strike problem and demonstrate potential solutions. This report describes the investigation and conceptual process leading to the development of crew protection designs, including an advanced harness geometry, a harness tensioner/retractor, and a harness mounted airbag that could be candidates for current as well as year 2000+ helicopter or light aircraft applications. The protective concepts were evaluated in a series of computer simulations and in 15 dynamic tests on a horizontal accelerator using a replication of an advanced attack helicopter crewstation interior with a stroking crewseat. Overall effectiveness and physiological compatibility of the protective concepts were evaluated under varying crash pulses and impact orientations. Results show significant improvement in reduction of head displacement and linear acceleration, torso displacement, inertia reel strap payout, and neck torque compared to a baseline conventional restraint. DTIC

N94-18774# Naval Research Lab., Washington, DC.

A USER TASK ANALYSIS FOR COMMAND AND CONTROL SYSTEMS AND ITS USE IN HUMAN-COMPUTER INTERACTION RESEARCH Interim Report, 1 Oct. 1992 - 30 Jun. 1993

DEBORAH HIX 3 Sep. 1993 33 p

(AD-A269877; NRL/MR/5530-93-7397) Avail: CASI HC A03/MF A01

The Advanced Interfaces Section of the Human-Computer Interaction (HCI) Laboratory at the Naval Research Laboratory (NRL) is engaged in creating and evaluating interactive computer systems that address the unique issues encountered in developing innovative, high performance human-computer interfaces. A goal of this project is to build a testbed based on Naval command and control (C2) systems as a vehicle for this research. Previous work at the HCI Lab has developed new interaction techniques-ways of using physical input and output devices to perform tasks in a human-computer interface. We now wish to transition into more realistic Naval-related applications for new techniques, in particular, command and control systems. This report discusses a user task analysis performed for interactive computer-based C2 systems; this task analysis is a basis for developing and evaluating new interaction techniques. As a result of this task analysis, appropriate user tasks for incorporation into the command-and-control-like testbed will be identified. The testbed will also incorporate some of the new interaction techniques, and will be used for empirical evaluation of these techniques in human-computer interfaces. DTIC

N94-18882 Army Research Inst. of Environmental Medicine, Natick, MA.

ROAD MARCH PERFORMANCE OF SPECIAL OPERATIONS SOLDIERS CARRYING VARIOUS LOADS AND LOAD DISTRIBUTIONS

JOSEPH KNAPIK, RICHARD JOHNSON, PHILIP ANG, HERBERT MEISELMAN, and CAROLYN BENDEL 1993 144 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(AD-A269198; USARIEM-T-14-93) Avail: CASI HC A07

This study examined the influence of load and load distribution on road march performance. Subjects were 21 Special Forces Soldiers who performed six individual road marches carrying three loads (34, 48, and 61 kg) and two pack systems (ALICE pack and an experimental double-pack). All marches were 20 km in length and soldiers were asked to complete the distance as rapidly as possible. Heart rates were monitored continuously during the march. Before and after each march, soldiers completed questionnaires and performed a series of tasks to evaluate cognitive

ability and performance on typical soldier tasks. At the end of each march soldiers' feet were examined for injuries. Results indicated that march times increased as loads increased and march times were faster with the ALICE pack than with the double-pack. Heart rate while marching was lower for double-pack even after adjustment for march time suggesting a lower energy expenditure. The double-pack resulted in less low back discomfort and a lower incidence of blisters at the highest load but also resulted in more discomfort in the neck and hips and more heat illness symptoms. Neither load nor load distribution affected soldiers' cognitive ability or performance on marksmanship tasks, grenade throw, leg strength, hand-grip strength, or obstacle course. On the other hand, the march itself (independent of load and load distribution) resulted in decrements in marksmanship ability (vertical shot group dispersion), leg strength, and time to complete the obstacle course. DTIC

N94-18886 Maryland Univ., College Park. Office of Research Administration and Advancement.

INTERDISCIPLINARY TRAINING IN LIFE SCIENCE (FY 1991 ASSERT) Annual Report, 1 Jun. 1992 - 31 May 1993

ROBERT M. STEINMAN 4 Aug. 1993 4 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract F49620-92-J-0260)

(AD-A269220; AFOSR-93-0677TR) Avail: CASI HC A01

This grant supports the interdisciplinary training (psychology, neuroscience, and computer science) of an advanced graduate student (Julie Epelboim), who is earning a Ph.D. in Psychology by participating as a graduate Research Assistant on AFOSR Grant 91-0124, entitled *Coordinated action in 3-D Space*. Her doctoral thesis will be derived from problems investigated in this parent grant which has two main thrusts. First, it tests alternative hypotheses about the mechanism that controls the gaze-shifts associated with arm motions, when an unrestrained, seated subject manipulates objects within arms's reach. The second thrust is to study the speed and accuracy of visually-guided hand movements and the correlation of these performance measures with binocular gaze-errors. Advancing knowledge in this rather technical interdisciplinary research area requires developing expertise in the areas included in Epelboim's AASERT training program, which has been designed so as to contribute to the goals of the parent grant and at the same time prepare her for a productive career as a research scientist during the next 3 or 4 decades. DTIC

N94-18935# California Univ., Berkeley. Lawrence Berkeley Lab.

INDOOR ENVIRONMENT PROGRAM

J. M. DAISEY Jun. 1993 34 p

(Contract DE-AC03-76SF-00098)

(DE93-018601; LBL-33442) Avail: CASI HC A03/MF A01

This paper reports progress during the year 1992 in the Indoor Environment Program in the Energy and Environment Division of Lawrence Berkeley Laboratory. Studies in the following areas are reported: energy performance and ventilation in buildings; physical and chemical characterization of indoor air pollutants; indoor radon; indoor air quality; exposure to indoor air pollutants; and risk analysis. Pollutants of particular interest include: radon; volatile, semi-volatile and particulate organic compounds; and combustion emissions including environmental tobacco smoke, carbon monoxide, and nitrogen oxides. DOE

N94-18992# Federal Aviation Administration, Atlantic City, NJ. Technical Center.

THE FAA TECHNICAL CENTER HUMAN FACTORS LABORATORY INFORMATION GUIDE

VINCENT J. LASEWICZ, JR. and MARK W. SMOLINSKY Apr. 1993 16 p

(AD-A269343; DOT/FAA/CT-TN93/15) Avail: CASI HC A03/MF A01

This information guide provides an overview of the capabilities of the FAA Technical Center's Human Factors Laboratory (HFL) and how those capabilities are being used to support research

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critical to the development and implementation of the National Airspace System (NAS). The HFL was officially opened and dedicated on November 2, 1992. This unique state-of-the-art facility is the only one of its kind in the FAA. It is important that the information about this facility is made available not only to FAA organizations, but academic and private sector organizations as well. This information guide specifically provides the reader with background on why the facility was developed, an in-depth overview of its unique design capabilities, a description of the type of work the HFL will be engaged in, and a representative sampling of the directions and goals of the HFL. DTIC

N94-19349*# Houston Univ., Clear Lake, TX. Research Inst. for Computing and Information Systems.

**ADVANCED SOFTWARE DEVELOPMENT WORKSTATION:
OBJECT-ORIENTED METHODOLOGIES AND APPLICATIONS
FOR FLIGHT PLANNING AND MISSION OPERATIONS**

MICHEL IZYGON 30 Jun. 1993 8 p

(Contract NCC9-16; RICIS PROJ. SR-02)

(NASA-CR-193706; NAS 1.26:193706) Avail: CASI HC A02/MF A01

The work accomplished during the past nine months in order to help three different organizations involved in Flight Planning and in Mission Operations systems, to transition to Object-Oriented Technology, by adopting one of the currently most widely used Object-Oriented analysis and Design Methodology is summarized.

Author (revised)

N94-19442# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Thermal Control and Life Support Div.

ENVIRONMENTAL CONTROL AND LIFE SUPPORT

Dec. 1992 63 p

(ESA-PSS-03-40-ISSUE-1; ETN-93-94880) Avail: CASI HC A04/MF A01

Top level definitions applicable to Environmental Control and Life Support (ECLS) terminology are presented. A breakdown of the functional requirements of ECLS subsystems, and guidelines to the ECLS design philosophy on atmosphere, water, food, hygiene and waste are given. The report constitutes a framework which should support the documentation of ECLS specifications for manned space projects. All designers are encouraged to use its terminology, the ECLS functional breakdown, and the given symbols. Appendices detail the ECLS specification tree, symbols, a verification method for the requirements, related documents, and acronyms and definitions. The report is not applicable for spacesuits and payloads. ESA

N94-19473*# Virginia Univ., Charlottesville. Dept. of Mechanical and Aerospace Engineering.

EFFICIENCY AND BIOFIDELITY OF OCCUPANT SIMULATIONS

WALTER D. PILKEY In NASA. Langley Research Center, Computational Methods for Crashworthiness p 155-163 Aug. 1993

Avail: CASI HC A02/MF A03

Efficiency and biofidelity of occupant simulations are addressed. Topics covered include: R (ratio of rebound energy to initial energy) and G (ratio of permanent deformation to maximum deformation) parameters; ATB simulator unloading behavior; motion of sphere relative to vehicle after vehicle decelerates; sphere for belt restraint; sphere data for wall impact; head acceleration vs. belt slack x-direction (measured); and head acceleration vs. belt slack x-direction (simulated). CASI

N94-19531# Kent State Univ., OH.

**A MULTIVARIATE ANTHROPOMETRIC METHOD FOR CREW
STATION DESIGN Final Report, Jan. 1989 - Jan. 1993**

GREGORY F. ZEHNER, RICHARD S. MEINDL, and JEFFREY A. HUDSON Mar. 1993 41 p

(Contract F33615-85-C-0541)

(AD-A270652; AL-TR-1993-0054) Avail: CASI HC A03/MF A01

Body size accommodation in USAF cockpits is still a significant problem despite all the years of experience and the many aircraft

designs that have been developed. Adequate reach to controls, body clearances (particularly during escape), and vision (internal and external) are all functions of pilot body size and position in the cockpit. One of the roots of this problem is the way cockpit accommodation is specified and tested. For many years the percentile pilot has been used. This paper describes the errors inherent in the percentile man approach and presents a multivariate alternative for describing the body size variability existing in a given flying population. A number of body size representative cases are calculated which, when used properly in specifying, designing, and testing new aircraft, should ensure the desired level of accommodation. The approach can be adapted to provide anthropometric descriptions of body size variability for a great many designs or for computer models of the human body by altering the measurements of interest and/or selecting different data sets describing the anthropometry of a user population. DTIC

N94-19570# Anthropology Research Project, Yellow Springs, OH.

**HUMAN INTEGRATION EVALUATION OF THREE HELMET
SYSTEMS Interim Report, Sep. 1991 - Nov. 1992**

SHERRI U. BLACKWELL and KATHLEEN M. ROBINETTE Mar. 1993 108 p

(Contract F33615-89-C-0572)

(AD-A271320; AL-TR-1993-0028) Avail: CASI HC A06/MF A02

As protective equipment becomes more complex, more sophisticated tests of fit and function must be designed to determine and assess the effects of interactions between the user and various elements of the equipment. Among the newest protective ensembles available on the market are helmets with built-in Night Vision Goggles (WG's) or Helmet Mounted Displays (HMD's). A program called the Interim-Night Integrated Goggle and Head Tracking System (I-NIGHTS) was established to examine such helmets. Under this program, a series of fit and performance tests of three helmet systems was done. This report documents the fit, or human integration, evaluation designed to determine how well each helmet accommodated test subjects for comfort, stability, and optical placement. The test method used was the first to examine these three elements simultaneously as well as the first to include the measurement of head contour and three-dimensional placement of key human features. Results were intended to be used to better understand the fit related effects on later performance testing of subjects in a centrifuge, on a drop tower, and under actual flying conditions. Recommendations were made regarding design features which appear to be most effective for accommodating people. DTIC

N94-19764 Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

**HUMAN-MACHINE INTERFACES Final Report, 1 Mar. 1990 -
31 Jul. 1993**

NATHANIEL DURLACH 31 Jul. 1993 26 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract AF-AFOSR-0200-90)

(AD-A270730; AFOSR-93-0769TR) Avail: CASI HC A03

The normal human auditory system suffers from many deficiencies in its ability to localize sound sources in space. Not only is it generally poor at determining the elevation and distance of a sound source, but in certain cases it is relatively poor at determining the azimuth of the source. The research discussed in this report is concerned with the development and evaluation of systems that result in improved localization, i.e., in supernormal auditory localization, by altering the localization cues that are available to the listener. Although such enhanced performance should be of value in essentially all systems that make use of auditory localization for conveying information to the human user, the application area of primary interest in this proposal is that of human-machine interfaces for teleoperator and virtual systems. In general, localization performance can be summarized in terms of (1) resolution and (2) response bias. Resolution refers to the ability to detect small changes in the spatial position of a sound source and to separate out multiple sources located at different positions,

as well as to the amount of information transfer that can be achieved in the identification of source position. Response bias refers to the average differences between perceived source position (as measured by the mean of the listener's objective responses) and the actual source position. DTIC

N94-19773# Midwest Systems Research, Inc., Dayton, OH.
FAA AIRBORNE DATA LINK HUMAN FACTORS RESEARCH PLAN Technical Note, Oct. 1991 - 1992
 ALBERT J. REHMANN, MICHAEL C. REYNOLDS, and MARK E. NEUMEIER Jul. 1993 54 p
 (AD-A271006; DOT/FAA/CT-TN93/5) Avail: CASI HC A04/MF A01

A five-year plan to perform research of human factors issues and topics related to Data Link implementations in general aviation and transport category aircraft is presented. Elements such as resource allocation and management and coordinated cooperative research efforts are considered to be critical and are carefully developed. DTIC

N94-19935# Dayton Univ., OH. Research Inst.
NIGHT VISION GOGGLE MODEL F4949 PREFLIGHT ADJUSTMENT/ASSESSMENT PROCEDURES Final Report, Mar. - Jun. 1993
 JOSEPH C. ANTONIO and WILLIAM E. BERKLEY Aug. 1993 21 p
 (Contract F33615-90-C-0005)
 (AD-A271079; AL/HR-TR-1993-0111) Avail: CASI HC A03/MF A01

Night vision goggles (NVG's) have been employed in a variety of aircraft for over twenty years. However, only recently has their application begun in fixed-wing fast movers. Research accomplished by the Night Vision Programs Office at the Aircrew Training Research Division of the USAF Armstrong Laboratory demonstrated the loss of NVG performance resulting from improper adjustments. This report describes correct adjustment procedures for the F4949 NVG system. The procedures described were developed so aircrews could take advantage of the adjustments available on the NVG's. Additionally, image descriptions are given to help aircrews evaluate NVG performance. Information on the proper equipment/space needed for proper evaluation is also included. DTIC

N94-20063*# Christopher Newport Coll., Newport News, VA.
 Dept. of Biology, Chemistry and Environmental Sciences.
SHIELDING FROM SPACE RADIATIONS Progress Report, 1 Jun. - 1 Dec. 1993
 C. KEN CHANG, FOROOZ F. BADAVID, and RAM K. TRIPATHI 1 Dec. 1993 39 p
 (Contract NCC1-178)
 (NASA-CR-194683; NAS 1.26:194683) Avail: CASI HC A03/MF A01

This Progress Report covering the period of 1 June 1993 to 1 Dec. 1993 presents the development of an analytical solution to the heavy ion transport equation in terms of a one-layer Green's function formalism. The mathematical developments are recasted into an efficient computer code for space applications. The efficiency of this algorithm is accomplished by a nonperturbative technique of extending the Green's function over the solution domain. The code may also be applied to accelerator boundary conditions to allow code validation in laboratory experiments. Results from the isotopic version of the code with 80 isotopes present for a single layer target material, for the case of an iron beam projectile at 600 MeV/nucleon in water is presented.

Author (revised)

N94-20137*# National Aeronautics and Space Administration.
 Ames Research Center, Moffett Field, CA.
QUINOA: AN EMERGING NEW CROP WITH POTENTIAL FOR CELSS
 GREG SCHLICK and DAVID L. BUBENHEIM Nov. 1993 9 p
 (Contract RTOP 199-61-12-28)

(NASA-TP-3422; A-93100; NAS 1.60:3422) Avail: CASI HC A02/MF A01

Chenopodium quinoa is being considered as a new crop for the Controlled Ecological Life Support System (CELSS) because of its high protein values (12 - 18%) and unique amino acid composition. Lysine, and essential amino acid that is deficient in many grain crops, is found in quinoa approaching Food and Agriculture Organization of the United Nations (FAO) standards set for humans. This 'new' crop, rich in protein and with desirable proportions of important amino acids, may provide greater versatility in meeting the needs of humans on long-term space missions. Initially, the cultivars CO407 x ISLUGA, CO407 Heat Tolerant Population 1, and Real' (a Bolivian variety) were examined. The first cultivar showed the most promise in greenhouse studies. When grown hydroponically in the greenhouse, with no attempt to maximize productivity, this cultivar produced 202 g m(exp -2) with a harvest index of 37%. None of the cultivars were greater than 70 cm in height. Initial results indicate that quinoa could be an excellent crop for CELSS because of the high concentration of protein, ease of use, versatility in preparation, and potential for greatly increased yields in controlled environments. Author

N94-20194* National Aeronautics and Space Administration.
 Lyndon B. Johnson Space Center, Houston, TX.
APPARATUS AND METHOD FOR MEASURING SUBJECT WORK RATE ON AN EXERCISE DEVICE Patent
 WILLIAM E. THORNTON, inventor (to NASA) 7 Sep. 1993 19 p Filed 15 Oct. 1991 Supersedes N92-17910 (30 - 8, p 1335)
 (NASA-CASE-MSC-21752-1; US-PATENT-5,242,339;
 US-PATENT-APPL-SN-775404; US-PATENT-CLASS-482-8;
 US-PATENT-CLASS-482-54; US-PATENT-CLASS-73-379.01;
 INT-PATENT-CLASS-A63B-22/02;
 INT-PATENT-CLASS-A63B-71/00) Avail: US Patent and Trademark Office

Method and apparatus for accurately simulating locomotion in a weightless environment, especially to prevent atrophy of a subject's musculoskeletal and cardiorespiratory systems during space travel, are disclosed. Forces, including the vertical, horizontal, and lateral force generated by an individual during locomotion on a treadmill using a rigid belt with rigid transfer elements supported by low friction bogies, are measured by strain gauges sensitive in their respective direction. The vertical forces produced by securing the subject to the treadmill via bungee cords, in conjunction with the measured velocity of the treadmill and the mode of locomotion, are used to determine the subject's equivalent weight. The other horizontal and lateral forces are used to determine the external work produced by the subject when locomotion is performed on a nonlevel surface with an effective grade angle. The measured forces are related in such a way that the grade angle is easily determined. A motor and additional circuitry can be added to the apparatus to measure and force a subject to maintain a predetermined work rate associated with a preselected grade angle and tread velocity.

Official Gazette of the U.S. Patent and Trademark Office

N94-20338*# California Univ., Los Angeles. Dept. of Physiological Science.
COSMOS 2229 Final Report
 V. REGGIE EDGERTON, ROLAND R. ROY, and JOHN A. HODGSON Nov. 1993 17 p
 (Contract NCC2-535; PROJ. K-7-33)
 (NASA-CR-194734; NAS 1.26:194734) Avail: CASI HC A03/MF A01

The 6 weeks preflight activities of the Cosmos project during 1993 included: modification of EMG connector to improve the reliability of EMG recording; 24 hour cage activity recording from all but two of the flight animals (monkeys); attempts to record from flight candidates during foot lever task; and force transducer calibrations on all flight candidate animals. The 4 week postflight recordings included: postflight recordings from flight animals; postflight recordings on 3 control (non-flight) animals; postflight recalibration of force transducers on 1 flight and 4 control

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(non-flight) animals; and attempts to record EMG and video data from the flight animals during postflight locomotion and postural activity. The flight EMG recordings suggest that significant changes in muscle control may occur in spaceflight. It is also clear from recordings that levels of EMG recorded during spaceflight can attain values similar to those measured on earth. Amplifier gain settings should therefore probably not be changed for spaceflight.

Derived from text

N94-20493* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

AUTOMATIC LOCKING ORTHOTIC KNEE DEVICE Patent

BRUCE C. WEDDENDORF, inventor (to NASA) 7 Dec. 1993 8 p Filed 26 Dec. 1991 Supersedes N92-17866 (30 - 8, p 1335) (NASA-CASE-MFS-28633-1; US-PATENT-5,267,950; US-PATENT-APPL-SN-813629; US-PATENT-CLASS-602-26; US-PATENT-CLASS-602-16; US-PATENT-CLASS-623-43; US-PATENT-CLASS-623-44; INT-PATENT-CLASS-A61F-5/00) Avail: US Patent and Trademark Office

An articulated tang in clevis joint for incorporation in newly manufactured conventional strap-on orthotic knee devices or for replacing such joints in conventional strap-on orthotic knee devices is discussed. The instant tang in clevis joint allows the user the freedom to extend and bend the knee normally when no load (weight) is applied to the knee and to automatically lock the knee when the user transfers weight to the knee, thus preventing a damaged knee from bending uncontrollably when weight is applied to the knee. The tang in clevis joint of the present invention includes first and second clevis plates, a tang assembly and a spacer plate secured between the clevis plates. Each clevis plate includes a bevelled serrated upper section. A bevelled shoe is secured to the tang in close proximity to the bevelled serrated upper section of the clevis plates. A coiled spring mounted within an oblong bore of the tang normally urges the shoes secured to the tang out of engagement with the serrated upper section of each clevis plate to allow rotation of the tang relative to the clevis plate. When weight is applied to the joint, the load compresses the coiled spring, the serrations on each clevis plate dig into the bevelled shoes secured to the tang to prevent relative movement between the tang and clevis plates. A shoulder is provided on the tang and the spacer plate to prevent overextension of the joint.

Official Gazette of the U.S. Patent and Trademark Office

N94-20606*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

LOADS PRODUCED BY A SUITED SUBJECT PERFORMING TOOL TASKS WITHOUT THE USE OF FOOT RESTRAINTS

SUDHAKAR L. RAJULU (Lockheed Engineering and Sciences Co., Houston, TX.), JEFFREY POLINER (Lockheed Engineering and Sciences Co., Houston, TX.), and GLENN K. KLUTE Dec. 1993 38 p (Contract NAS9-17900) (NASA-TP-3424; S-744; NAS 1.60:3424) Avail: CASI HC A03/MF A01

With an increase in the frequency of extravehicular activities (EVA's) aboard the Space Shuttle, NASA is interested in determining the capabilities of suited astronauts while performing manual tasks during an EVA, in particular the situations in which portable foot restraints are not used to stabilize the astronauts. Efforts were made to document the forces that are transmitted to spacecraft while pushing and pulling an object as well as while operating a standard wrench and an automatic power tool. The six subjects studied aboard the KC-135 reduced gravity aircraft were asked to exert a maximum torque and to maintain a constant level of torque with a wrench, to push and pull an EVA handrail, and to operate a Hubble Space Telescope (HST) power tool. The results give an estimate of the forces and moments that an operator will transmit to the handrail as well as to the supporting structure. In general, it was more effective to use the tool inwardly toward the body rather than away from the body. There were no differences in terms of strength capabilities between right and left hands. The

power tool was difficult to use. It is suggested that ergonomic redesigning of the power tool may increase the efficiency of power tool use.

Author (revised)

N94-20665*# Colorado State Univ., Fort Collins. Center for Engineering Infrastructure and Sciences in Space.

CHARACTERIZATION OF MINNESOTA LUNAR SIMULANT FOR PLANT GROWTH Abstract Only

JAMES P. OGLESBY, WILLARD L. LINDSAY, and WILLY Z. SADEH In Lunar and Planetary Inst., Twenty-Fourth Lunar and Planetary Science Conference. Part 3: N-Z p 1099 1993 Avail: CASI HC A01/MF A06

Processing of lunar regolith into a plant growth medium is crucial in the development of a regenerative life support system for a lunar base. Plants, which are the core of such a system, produce food and oxygen for humans and, at the same time, consume carbon dioxide. Because of the scarcity of lunar regolith, simulants must be used to infer its properties and to develop procedures for weathering and chemical analyses. The Minnesota Lunar Simulant (MLS) has been identified to date as the best available simulant for lunar regolith. Results of the dissolution studies reveal that appropriately fertilized MLS can be a suitable medium for plant growth. The techniques used in conducting these studies can be extended to investigate the suitability of actual lunar regolith as a plant growth medium. Dissolution experiments were conducted using the MLS to determine its nutritional and toxicity characteristics for plant growth and to develop weathering and chemical analysis techniques. Two weathering regimes, one with water and one with dilute organic acids simulating the root rhizosphere microenvironment, were investigated. Elemental concentrations were measured using inductively-coupled-plasma (ICP) emission spectrometry and ion chromatography (IC). The geochemical speciation model, MINTEQA2, was used to determine the major solution species and the minerals controlling them. Acidification was found to be a useful method for increasing cation concentrations to meaningful levels. Initial results indicate that MLS weathers to give neutral to slightly basic solutions which contain acceptable amounts of the essential elements required for plant nutrition (i.e., potassium, calcium, magnesium, sulfur, zinc, sodium, silicon, manganese, copper, chlorine, boron, molybdenum, and cobalt). Elements that need to be supplemented include carbon, nitrogen, and perhaps phosphorus and iron. Trace metals in solution were present at nontoxic levels.

Derived from text

N94-20914# Aerospace Medical Research Labs., Wright-Patterson AFB, OH. Crew Systems Directorate.

SYSTEM TEST RESULTS OF THE ADVANCED TECHNOLOGY ANTI-G SUIT (ATAGS) Final Report, Oct. 1991 - Nov. 1992

LARRY J. MEEKER, JOHN H. OLHAUSEN, and GRADY L. RIPLEY Nov. 1992 10 p (Contract AF PROJ. 2830) (AD-A271535; AL/CF-TP-1993-0033) Avail: CASI HC A02/MF A01

Previous centrifuge and flight testing have shown that the ATAGS offers superior G endurance protection even when operated at lower pressures than the standard anti-G suit. All of the previous ATAGS testing was done, however, using human test subjects for the purpose of evaluating G protection. The purpose of the parametric tests was to provide basic system data such as volumes, fill rates and pressure differentials for the ATAGS. In order to allow direct comparison with data taken previously on the AF standard anti-G suit (CSU-13A/P), these tests were based on procedures detailed in SAM-TR-78-12, Engineering Test, and Evaluation During High G, VOL III: Anti-G Suits. ATAGS volumes were measured using pressure change during expansion from a known volume. The volumes of several suit sizes were taken, both with the suit unmounted and mounted on a mannequin to a proper fit. Total flow was measured with a flowmeter in the main fill hose. Differential pressure in various parts of the suit during rapid fill was measured at test points located on both sides of the abdominal bladder, on each thigh, and at the bottom of each leg. Preliminary data from these tests are presented.

DTIC

N94-21154 Naval Air Warfare Center, Patuxent River, MD. Aircraft Div.

IN-FLIGHT MEASUREMENT OF AIRCREW BREATHING IN NAVY AIRCRAFT

DENNIS N. GORDGE 20 Sep. 1993 74 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(AD-A271811; NAWCADPAX-TM-93-59-SY) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

A man-mounted, aircraft independent, self-contained recording system was developed for measuring the breathing flow rates of aircrew during all phases of flight. Breathing data of 41 Navy and Marine Corps aircrew operating F-14, F/A-18, A-7, A-6, and S-3 aircraft were measured during 51 flights including fleet combat exercises. The data were collected to validate current test and evaluation techniques and to modify oxygen system design and installation specifications. The data may also be used for designing future oxygen systems. The data generally show good correlation with previous studies, but also provide unique results for carrier operations and aerial combat maneuvering (ACM) conditions not previously reported. The results indicate that the current military oxygen system flow rate specifications are inadequate for tactical aircraft performing ACM. The results also suggest that current F-14 and F/A-18 oxygen systems may be inadequate for low altitude ACM. DTIC

N94-21247# Aerospace Medical Div., Brooks AFB, TX.
PHYSIOLOGICAL EFFICACY OF A LIGHTWEIGHT AMBIENT AIR COOLING UNIT FOR VARIOUS APPLICATIONS Final Report, Oct. 1988 - Sep. 1991

YASU T. CHEN, SUSAN H. BOMALASKI, and STEFAN H. CONSTABLE Oct. 1993 18 p
(Contract AF PROJ. 2729)

(AD-A272952; AL-TP-1993-0013) Avail: CASI HC A03/MF A01

In an attempt to further advance intermittent conditioned air cooling (IC) concept, a strategy of supplementing continuous air cooling (CC) was conceived. With this approach, ambient air cooling (AC) is added during work with conditioned air cooling delivered during rest periods. A compact, battery-powered belt-pack cooling unit (8.5 lb), designed and fabricated at the USAF Armstrong Laboratory, was used to deliver 12 cfm filtered ambient air during work cycles: 10 cfm to the body and 2 cfm to the face. Five experimental trials were completed in a thermally controlled chamber under warm conditions (32 deg C, 40% RH) consisting of no cooling (NC), IC, and CC during intermittent exercise, as well as NC and AC during continuous exercise. This study suggests that ambient air delivered during work by a lightweight portable unit can be applied in conjunction with conditioned air during rest to further improve personal comfort, reduce skin temperature, and decrease the cumulative fatigue seen over repeated work/rest cycles in selected military and industrial applications. DTIC

N94-21309# Acoustical Society of America, New York, NY.

U.S. TAG FOR ISO/TC 43, ACOUSTICS, IEC/TC 29 ELECTROACOUSTICS, AND ISO/TC 108/SC4 HUMAN EXPOSURE TO MECHANICAL VIBRATION AND SHOCK: MINUTES OF THE ACCREDITED STANDARDS COMMITTEE ON BIOACOUSTICS, S3

20 May 1993 108 p Meeting held in Ottawa, Canada, 20 May 1993

(AD-A273014; S3/368) Avail: CASI HC A06/MF A02

Presented are the minutes of the meeting of the Accredited Standards Committee on Bioacoustics, S3, held on November 3, 1992, as well as attachments containing summaries and correspondence on topics relating to ANSI standards on acoustics and human exposure. Included as attachments are S3 standards, working groups, and project status summaries. CASI

N94-21403 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials and Processes Div.

TOXICITY OF THERMAL DEGRADATION IN A MANNED SPACE ENVIRONMENT

M. D. JUDD and D. BRYANT In CNES, Fifth International Symposium on Materials in a Space Environment p 457-471 Jun. 1993

Copyright Avail: CEPADUES-Editions, 111, rue Nicolas-Vaughelin, 31100 Toulouse, France

An overview of current thinking with regard to flammability and associated hazards pertinent to the special circumstances encountered in a manned space environment is given. The fire performance of materials needs to be assessed on a more comprehensive basis than the past and the first steps to achieving this are presented. More emphasis is necessary on the importance of understanding the toxicity of decomposition products, however difficult this is to quantify in practice. The extra safety problems associated with long term missions in space have to be tackled early in the design stage. The recent decision by the Space Station planners to choose an atmosphere of 30% O₂ at 10.7 psi for facilitating EVA (Extravehicular Activity) will undoubtedly lead to a large amount of material testing since most current data is at 24.5% O₂ normal pressure. ESA

N94-21627*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

STRENGTH CAPABILITIES AND LOAD REQUIREMENTS WHILE PERFORMING TORQUING TASKS IN ZERO GRAVITY

JEFFREY POLINER (Lockheed Engineering and Sciences Co., Houston, TX.), ROBERT P. WILMINGTON (Lockheed Engineering and Sciences Co., Houston, TX.), and GLENN K. KLUTE 1 Dec. 1993 22 p

(NASA-TP-3433; S-751; NAS 1.60:3433) Avail: CASI HC A03/MF A01

A generic examination of the loads produced by individuals performing maximal efforts with a torquing tool in zero gravity, to determine operator strength when performing torquing tasks; quantify the loads placed on foot restraints while performing these tasks; and examine effects of orientation and direction of tool rotation on strength effectiveness was conducted. The experiment was conducted aboard NASA's KC-135 reduced-gravity aircraft, using two force plates attached to a test stand, one with a foot restraint. Subjects used a wrench to apply maximum torques to various fittings, in different positions, in clockwise and counterclockwise directions. It was seen that these subjects could produce approximately 400 to 750 N of force, depending on the orientation of the tool and the direction of effort. The most force could be produced when pushing the tool upwards. A force effectiveness ratio (FER) defined as an indication of how much of the subjects' total effort actually went into performing the desired task. Values of FER ranged from 0.55 to 0.90, with the greatest FER occurring with UP and DOWN efforts, and the lowest with AWAY and LEFT efforts. Designers can use these results to set specifications for craft structures; tools can be developed based on the known strength of the tool users; and tasks can be developed to not exceed the crewmembers' capabilities.

Author (revised)

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SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

N94-20336*# Harvard Univ., Cambridge, MA.

WIDE-BANDWIDTH HIGH-RESOLUTION SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE Semiannual Status Report, 15 Jun. - 15 Dec. 1993

PAUL HOROWITZ 15 Dec. 1993 27 p

(Contract NAGW-2872)

(NASA-CR-194724; NAS 1.26:194724) Avail: CASI HC A03/MF A01

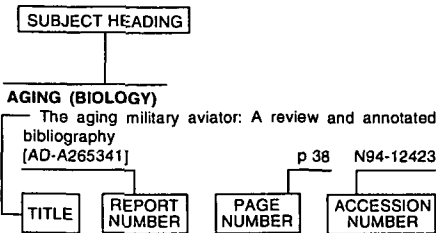
A third antenna was added to the system. It is a terrestrial low-gain feed, to act as a veto for local interference. The 3-chip

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design for a 4 megapoint complex FFT was reduced to finished working hardware. The 4-Megachannel circuit board contains 36 MByte of DRAM, 5 CPLDs, the three large FFT ASICs, and 74 ICs in all. The Austek FDP-based Spectrometer/Power Accumulator (SPA) has now been implemented as a 4-layer printed circuit. A PC interface board has been designed and together with its associated user interface and control software allows an IBM compatible computer to control the SPA board, and facilitates the transfer of spectra to the PC for display, processing, and storage. The Feature Recognizer Array cards receive the stream of modulus words from the 4M FFT cards, and forward a greatly thinned set of reports to the PC's in whose backplane they reside. In particular, a powerful ROM-based state-machine architecture has been adopted, and DRAM has been added to permit integration modes when tracking or reobserving source candidates. The general purpose (GP) array consists of twenty '486 PC class computers, each of which receives and processes the data from a feature extractor/correlator board set. The array performs a first analysis on the provided 'features' and then passes this information on to the workstation. The core workstation software is now written. That is, the communication channels between the user interface, the backend monitor program and the PC's have working software.

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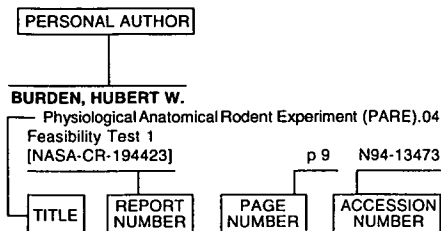
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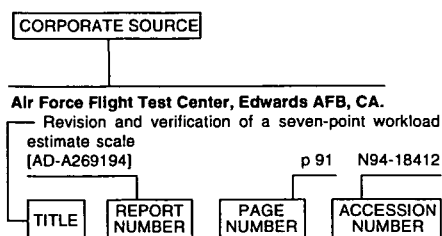
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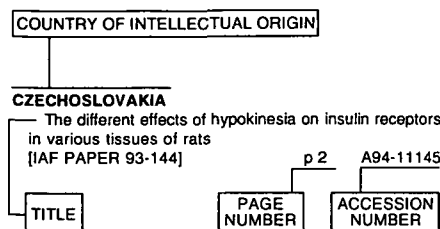
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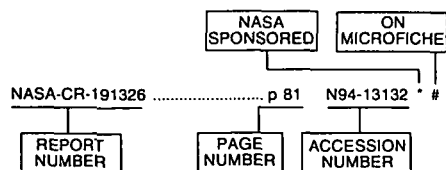
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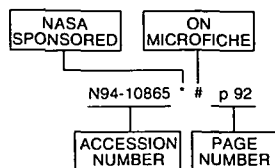
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REPORT DOCUMENT PAGE

1. Report No. NASA SP-7011 (386)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 386)		5. Report Date March 1994	
		6. Performing Organization Code JTT	
7. Author(s)		8. Performing Organization Report No.	
		10. Work Unit No.	
9. Performing Organization Name and Address NASA Scientific and Technical Information Program		11. Contract or Grant No.	
		13. Type of Report and Period Covered Special Publication	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546-0001		14. Sponsoring Agency Code	
		15. Supplementary Notes	
16. Abstract This report lists 117 reports, articles and other documents recently announced in the NASA STI Database.			
17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement Unclassified - Unlimited Subject Category - 52	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 60	22. Price A04/HC

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